GLONASSSoft

Operation manual

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ТНВЭД 8526 91 800 0

Version 3.1

GPS trackers

UMKa310

UMKa311

UMKa312x

www.glonasssoft.ru

2022 г.

TABLE OF CONTENTS

INTRODUCTION

This Operating Manual (subsequently referred to as the manual, OM) covers instructions for installation and connection of the Automotive Tracker UMKa310, UMKa311 and UMKa312 (subsequently referred to as the tracker, device, and product), as well as tracker operation and configuring descriptions.

The manual is designed for technicians understanding vehicle repair and maintenance procedures, with expertise in electrical and electronic equipment for various vehicles.

In order to ensure proper operation, only skilled technicians should perform installation and setting of the tracker. For the tracker use to be successful, one should get acquainted with the operating principle of navigation system and grasp the purpose of all its components. Therefore, before starting, it is strongly recommended to learn the operating fundamentals of GPS/GLONASS navigation systems and GSM networks, and the peculiarities of data transmission via GPRS as well.

This manual describes the operation of the product equipped with the versions of firmware and configurator listed in the Table 1.1.

Table 1.1 Software version

Software	Version
Tracker firmware	1.3.3
Configurator	1.18.4
Mobile configurator	1.17.5

The product meets these technical specifications: ТУ 26.30.11-001-29608716-2018.

The manufacturer reserves the right to modify design, technical characteristics and software without notice. Contact this address to get information on the latest changes:

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1 PURPOSE AND USE CONDITIONS

1.1 General information

The tracker is designed to be installed in vehicles as auxiliary equipment for tracking vehicle location, speed and movement direction.

An extra range of parameters is logged as well, e.g.: analog input status, digital input status and sensor readings. The tracker also provides peripheral control for equipment connected to the discrete output.

Event and status logs are stored in the non-volatile memory. Accumulated data is transmitted over GSM mobile network using GPRS technology to dedicated servers with static IP addresses or domain names. The data on servers is accessible via the Internet for further processing and analysis on a dispatcher console.

The tracker is configured either directly via the USB-interface or remotely: either via the remote control server or with GPRS/SMS commands; configuration can be performed via Bluetooth as well.

Data transmission is only possible when the selected GSM 850/900/1800/1900 mobile network supporting GPRS is available. To ensure data integrity in case of an external power loss or GSM signal loss the tracker is provided with the internal non-volatile memory storage.

Figure 1.1 Trackers overview (310 - on the right, 311 - on the left, 312 - below)

Vehicle traffic route is logged as discrete spots containing all the data from internal sensors and auxiliary equipment. A route spot is recorded even if one of listed events occurs: vehicle-course angle exceeds set value, straight-line driving distance exceeds

set values, acceleration exceeds set values, time lapse in motion (stop) spotting, equipment status change, and occurrence of the analog/digital input events.

Therefore, traffic route spots can be recorded within the intervals ranging from one second to several minutes rendering high-quality track tracing possible without redundant packets in GPRS traffic.

1.2 Technical characteristics

The main technical characteristics are listed in Table 1.2.

Table 1.2 Main technical characteristics

Feature	Value
Navigation systems	GPS, GLONASS
Number of GNSS Receiver Channels	Tracking – 33, acquisition – 99
GNSS Receiver sensitivity	-166 dBm (GLONASS + GPS)
Main data transmission channel	GSM 850/900/1800/1900
Number of SIM card slots, form factor	1, nano-SIM (4FF)
Antenna type	Internal
PC gateway	USB, Bluetooth
Number of spots in the tracker memory	10000*
Number of analog inputs	1 (UMKa310 and UMKa312) No (UMKa311)
Analog input voltage range, V	0…40
Number of discrete outputs	1 No (UMKa311)
Built-in accelerometer	Yes
RS-485 interface	Yes, in versions with “R” letter
Bluetooth interface	Yes, v4.0
Supply voltage, V	8…40
Consumption current (at a voltage of 13,8 V), mA	Average - 35, max. – 160
Positional accuracy, m	<2.5
Velocity accuracy, m/s	0.05
Temperature range, °C	-40…+85
Dimensions, mm	33x64x13 (UMKa310) 67x46x24 – UMKa311 90x71x26 –UMKa312
Max weight, g	40
Case protection rating	IP54
Hosting protection (the possibility of change for telematic server is switched off)	In versions with «H» letters
Battery	In UMKa312 only
CAN interface	In UMKa311 only

1.3 Tracker block diagram

Block diagram of UMKa 310 tracker is given in Figure 1.2.

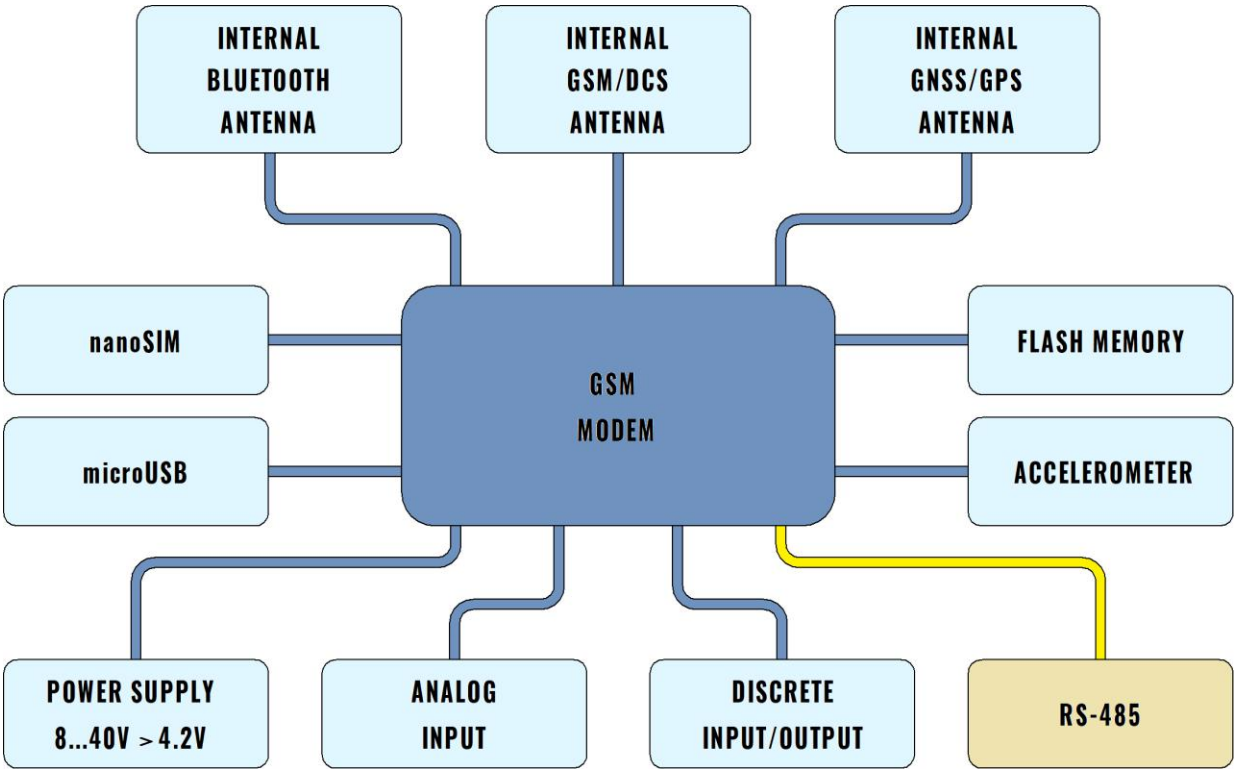


Figure 1.2 Block diagram of the navigation tracker UMKa310

1. GSM modem
2. Nano-SIM – SIM card slot
3. Analog input – for monitoring vehicle parameters using analog data
4. Micro USB interface – for device flashing and configuring
5. Discrete input – for connecting discrete sensors
6. Bluetooth
7. GSM/DCS
8. GNSS/GPS
9. Accelerometer
10. Power supply – from 8 to 40 V
11. RS-485 – in UMKa310.R version

Block diagram of UMKa 311 tracker is given in Figure 1.3

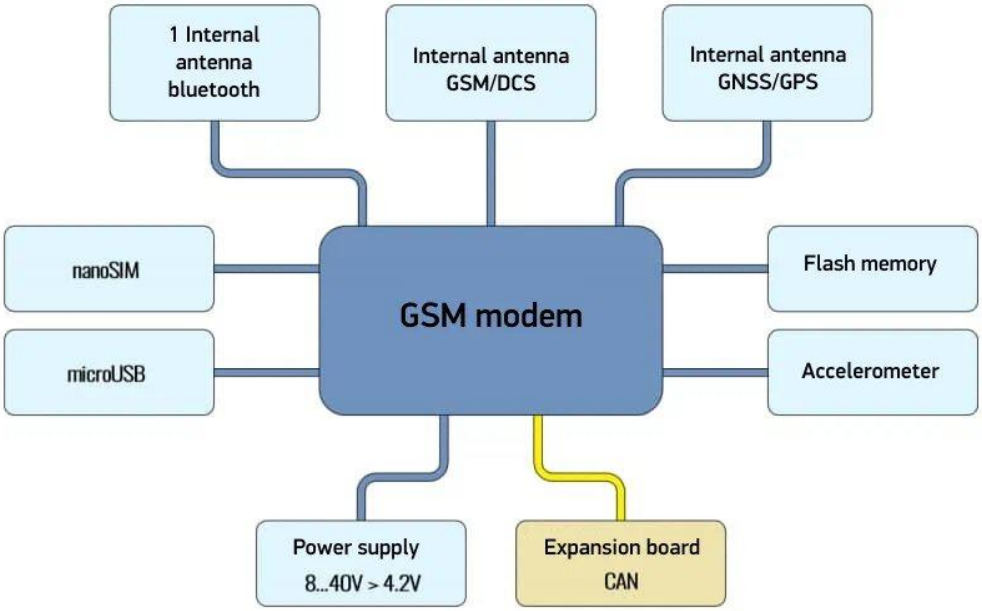


Figure 1.3 Block diagram of navigation tracker UMKa311

1. GSM modem
2. Nano-SIM – SIM card slot
3. Micro USB interface – for device flashing and configuring
4. Bluetooth
5. GSM/DCS
6. GNSS/GPS
7. Accelerometer
8. Power supply – from 8 to 40 V
9. CAN expansion board - in version UMKa311.C

Block diagram of UMKa 312 tracker is given in Figure 1.4

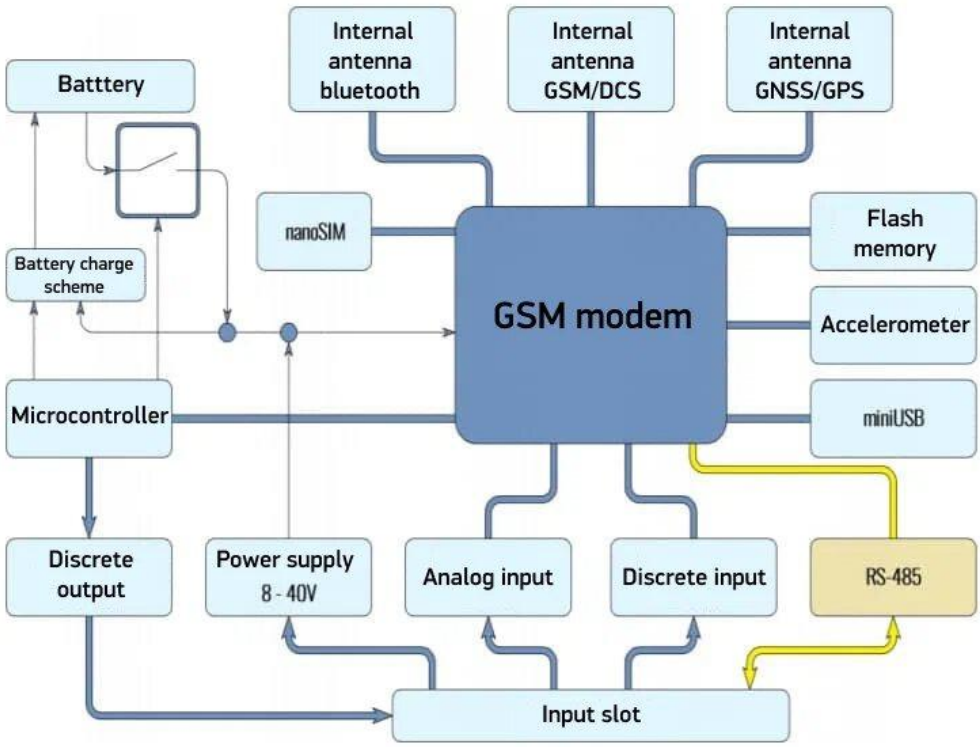


Figure 1.4 Block diagram of navigation tracker UMKa312

1. GSM modem
2. Nano-SIM – SIM card slot
3. Analog input – for monitoring vehicle parameters using analog data
4. Micro USB interface – for device flashing and configuring
5. Discrete input – for connecting discrete sensors
6. Bluetooth
7. GSM/DCS
8. GNSS/GPS
9. Accelerometer
10. Power supply – from 8 to 40 V
11. RS-485 – in UMKa310.R version
12. Battery

2 INSTALLATION

2.1 Tracker description

Basic elements are presented in Figure 2.1.

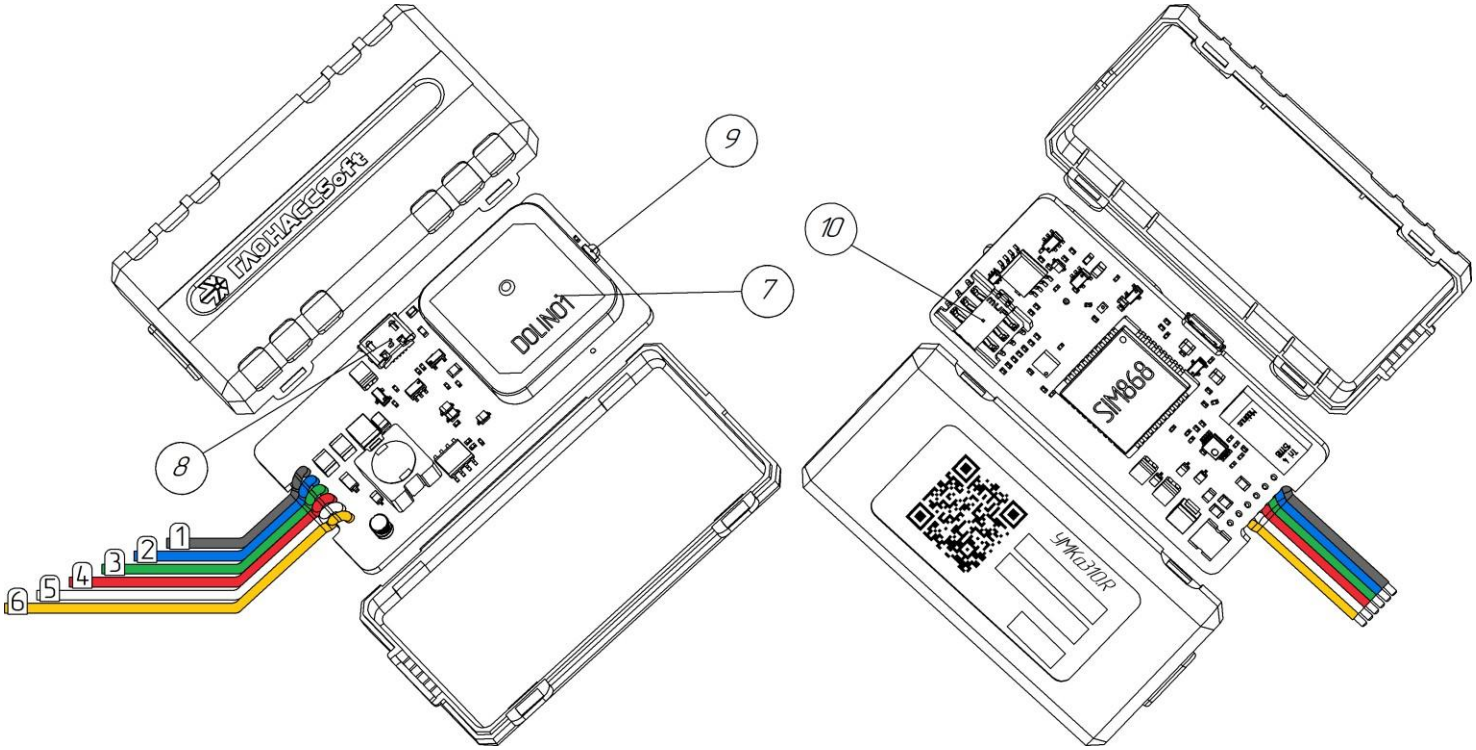


Figure 2.1 Tracker UMKa310 basic elements

1. Ground (black)
2. Discrete input-output (blue)
3. Analog input (green)
4. VDC (red)
5. Line B (white)*
6. Line A (yellow)*
7. GNSS antenna
8. USB port
9. Status LED
10. SIM card slot

* - for UMKa310.R version.

Attention! The tracker without power supply should not be connected to a PC for configuration. It is obligatory to connect an external power supply.
If the configurator cannot find the tracker, check whether the drivers have been installed. If there are no drivers, it is recommended to reinstall the configurator checking the box “Install drivers” (Figure 3.5).

Basic elements for UMKa311 are presented in Figure 2.2.

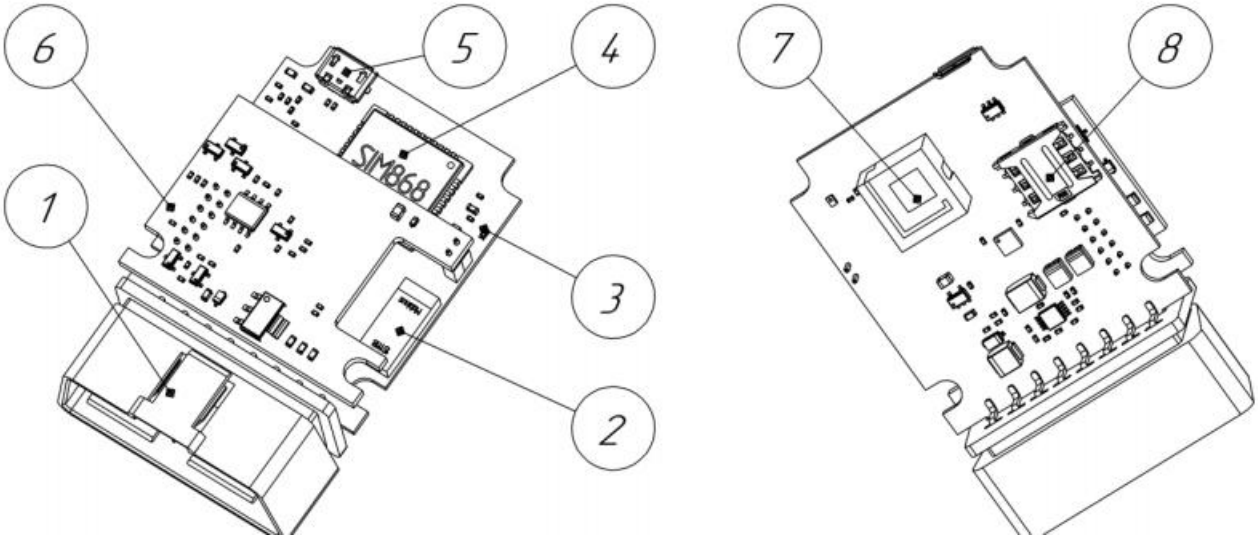


Figure 2.2 Tracker UMKa311 basic elements

1. OBD port
2. GSM antenna
3. LED
4. Modem
5. USB port
6. Expansion board
7. Antenna
8. SIM card slot

Basic elements for UMKa312 are presented in Figure 2.3.

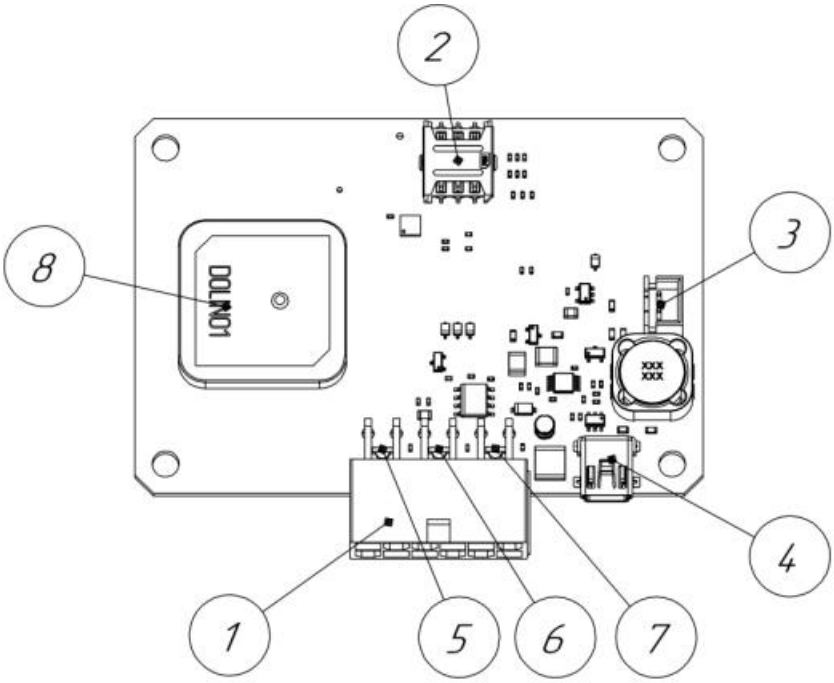


Figure 2.3 Tracker UMKa312 basic elements

1. Connecting slot
2. SIM card slot
3. Battery connection slot
4. Mini-B type USB interface slot
5. Red LED of GNSS status
6. Yellow LED of GSM status
7. Green LED of power supply
8. GNSS antenna

2.2 Tracker versions

There is a range of versions for trackers UMKa310, UMKa311, UMKa312 given in table 2.4. In addition to table 2.4 there are versions with “H” letter in versions range that means “Hosting protection”. More detailed description of hosting protection find in section 2.20

Table 2.4 Trackers versions

Version	RS-485	BLE	Hosting protection	Battery	CAN
UMKa310	-	-	-	-	-
UMKa310.R	+	-	-	-	-
UMKa310.B	-	+	-	-	-
UMKa310.BR	+	+	-	-	-
UMKa311	-	+	-	-	-
UMKa311.C	-	+	-	-	+
UMKa313.2	-	+	-	+	-
UMKa312.R2	+	+	-	+	-

2.3 Pinout

Pin numeration for the tracker UMKa310 is represented in Figure 2.5. Pin assignment is given in Table 2.5.

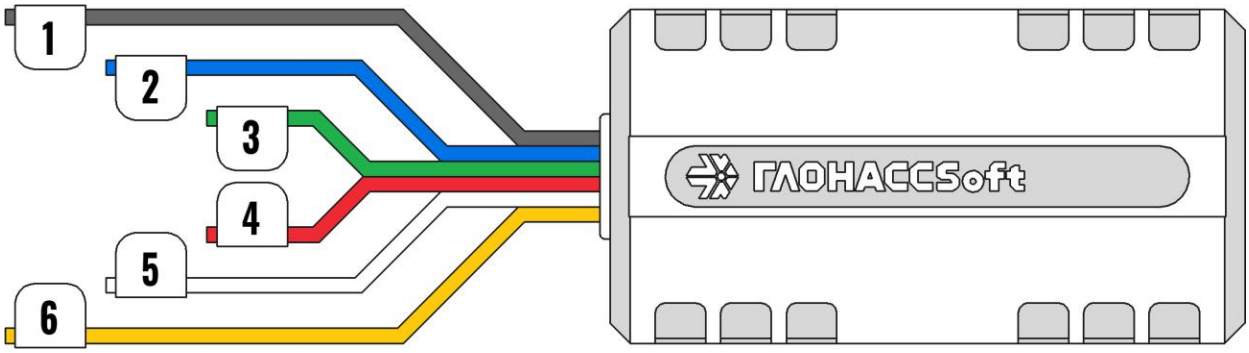


Figure 2.5 UMKa310 tracker pin numeration

Table 2.5 Pin assignment

Pin number	Assignment
1	GND (black)
2	Discrete input-output (blue)
3	Analog input (green)
4	VDC (red)
5	Line B (white)*
6	Line A (yellow)*

* - for UMKa310.R version.

Pin numeration for the tracker UMKa311 is represented in Figure 2.6. Pin assignment is given in Table 2.6.

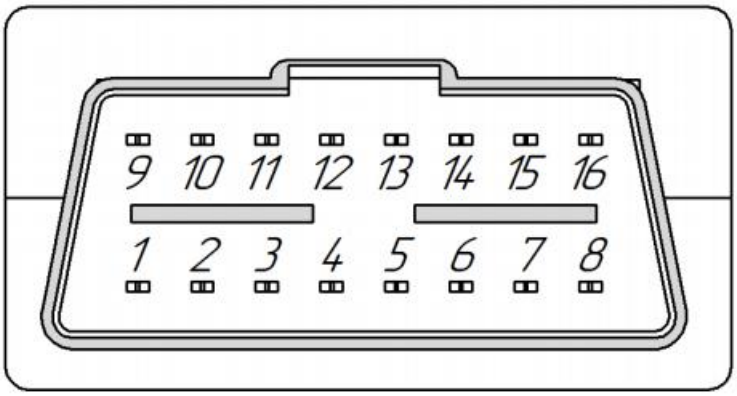


Figure 2.6 Pin numeration UMKa311

Table 2.6 Pin assignment

Pin number	Assignment
3	CAN H interface (customized)
4	GND(-)
5	GND(-)
6	CAN H interface (by default in UMKa311.C version)
11	CAN L interface (customized)
14	CAN L interface (by default in UMKa.C version)
16	VDC (+)

-*CAN expansion board is only in UMKa311.C version

Other outputs are not used

Pin numeration for the tracker UMKa312 is represented in Figure 2.7. Pin assignment is given in Table 2.7.

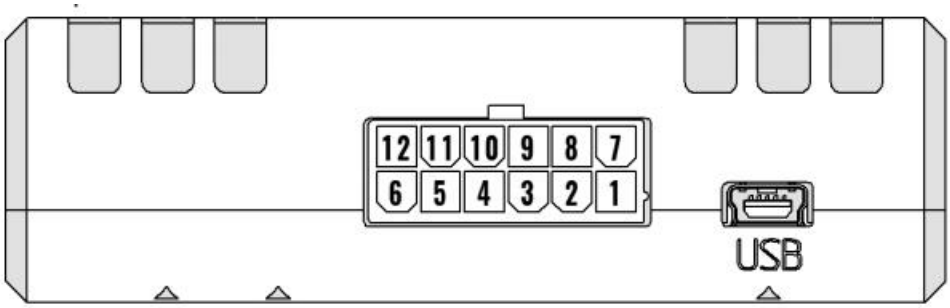


Figure 2.7 Pin numeration UMKa312

Table 2.7 Pin assignment

Pin number	Assignment
1	Power supply (+)
2	RS-485 (A)*
3	RS-485 (B)*
4	Input 0. Analog 0. IN0 (AIN0)
5	Not used
6	Not used
7	GND (-)
8	Not used
9	Output 0. “Open drain“. OUT (OUT0)
10	Input 1. Digital 0. IN1 (DIN0)
11	Not used
12	Not used

-* for UMKa312.R version

2.4 Device firmware updating

There are two ways to update the tracker firmware: via the configurator or via the remote control server.

The tracker is automatically updated to the release version. If the tracker failed to update automatically, it can be updated via configurator: on the toolbar click “Firmware update” or enter “UPDATE” command in the “Console” tab. If on the toolbar the tracker does not display firmware update being available, click “Check for updates”. One can also update firmware by sending SMS command “UPDATE” to the tracker phone number.

It is possible to update the tracker manually. To this effect, close the configurator and put the required firmware file into the folder “C:\Program Files (x86)\UMKa3XX\firmware”. Then open the configurator, wait for the loading to end until the suggestion to update the tracker appears.

If necessary, it is possible to update to the test version of firmware. In order to do that, perform manual updating described above or send SMS command “UPDATE VER=X.Y.Z” (command description ref. app. A) to the tracker telephone number.

Attention! The tracker is updated in two stages with two reboots. After the first reboot, the tracker boots with the old firmware version. Please, wait for the second reboot. It will occur within one minute.

2.5 Installing SIM card

In order to install a SIM card into UMKa311, slightly bend the casing snaps, then open the casing and take the board out (Figure 2.8 on the left).

For installation into UMKa311/UMKa312 open tracker casing with beforehand unscrewing of fixing screws with PH 1 cross-head driver (Figure 2.8 on the right) and take the board out.

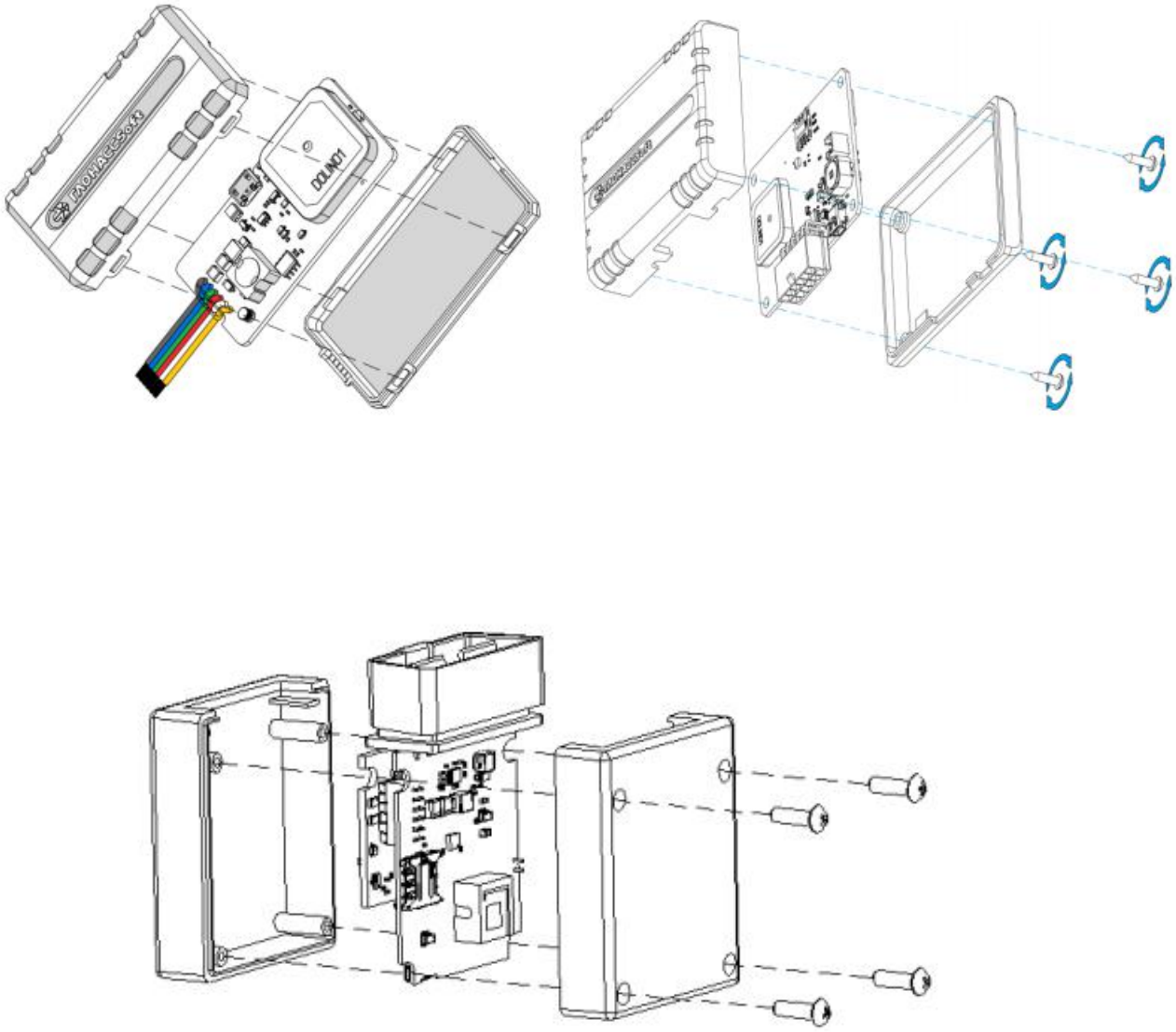


Figure 2.8 Opening tracker casing (310 - on the left, 312 - on the right, 311 - below)

There is a SIM card slot of nano-SIM form factor on the board.
Install SIM card according to Figure 2.9.
After the SIM card is installed, assemble the device in reverse order.

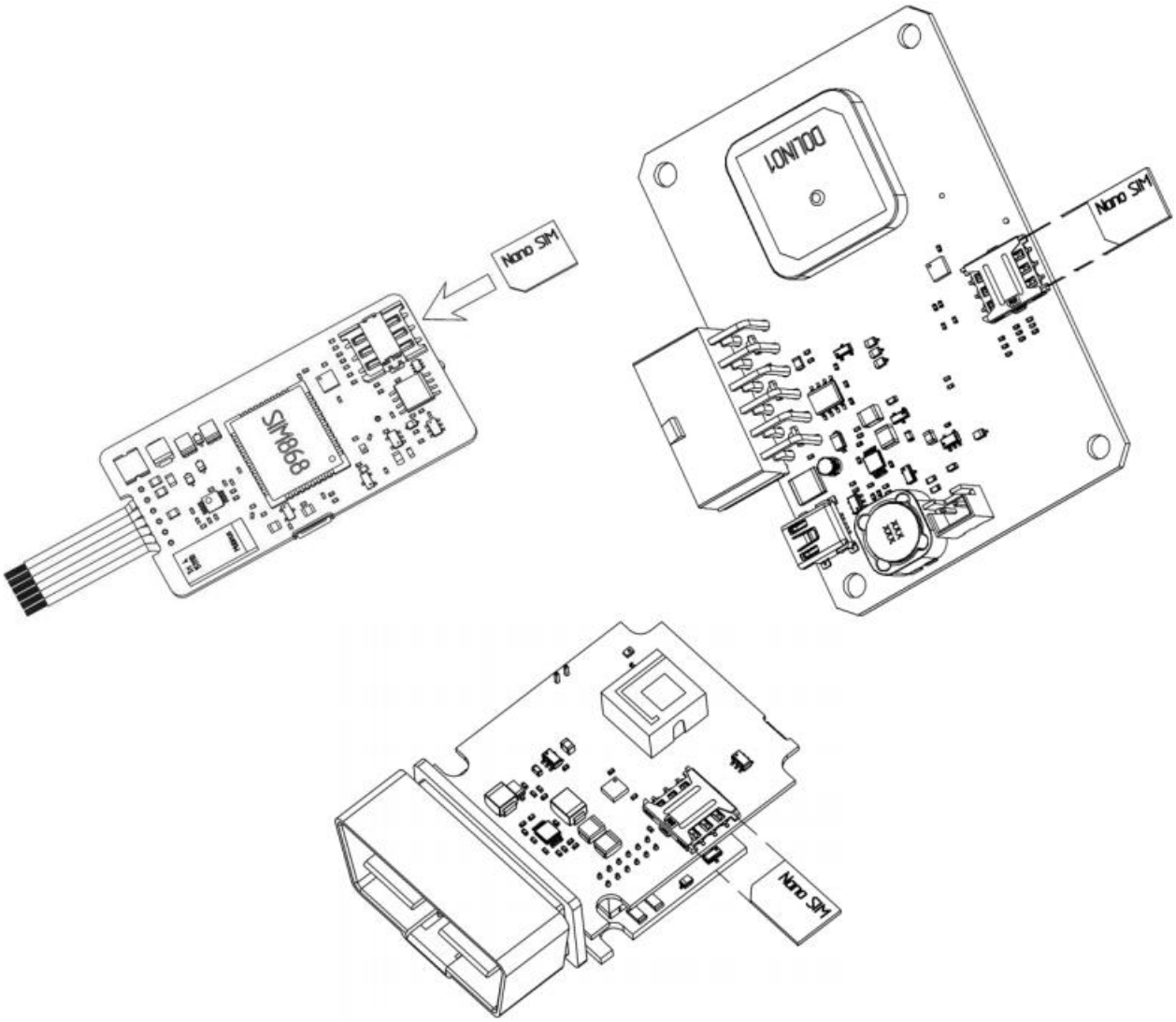


Figure 2.9 SIM card installation (310 – on the left; 312 – on the right; 311 - below)

2.6 Installing the tracker in a vehicle

When mounting the tracker, take into consideration that the GLONASS/GPS antenna should be oriented in space in such manner as to point the peak of the radiation pattern to the sky zenith. Radiation pattern of the flat ceramic antenna installed inside the tracker is hemispherical, and it is therefore recommended to install the tracker horizontally. In other positions, the main source is a re-reflected signal, which considerably impairs positioning accuracy and affects navigation task time.

Presence of metal objects near the antenna, especially in the direction of the main

beam, markedly impairs signal reception.

The tracker should be installed as far as possible from the RF interference sources (interrupters, transmitters, etc.).

It is recommended to place the power wire and other wiring into corrugated protection pipe. And try to avoid cable sagging, as it can cause the cable cuts. In order to fasten the cable use some special fasteners (e.g., nylon ties).

Do not install the tracker near any heat sources (such as, exhaust manifolds, radiators, etc.).

The tracker itself and all the connected cables should be securely fastened and do not interfere with the proper operation of the vehicle machinery.

It is recommended to use either special clamping wire connectors or the mating cable connectors for hooking-up (e.g., hooking-up to the CAN bus via the special socket).

2.7 Battery installation

Only for UMKa312!

For recording and transmitting the cut-off of external power supply and also for quick-start of navigation module after starting the power supply, tracker can be equipped with internal battery. Also it is recommended to install the battery for providing data integrity and mitigating the risk of data loss.

For battery installation open the tracker casing and take the board out (ref. Installing SIM card). Then connect the battery to correspondent slot as is shown in the picture (Figure 2.10).

The battery itself is fixed to the upper casing part with hot adhesive or double-sided adhesive tape. In this case the battery is located in the manner so that GPS and GNSS antennas are not blocked as soon as the terminal is assembled. In Figure 2.10 the optimum spot for placing the battery is represented.

Attention! The battery is pre-installed by manufacturer in certain versions of device. If there is no battery in the given versions, it can be purchased extra from device manufacturer.

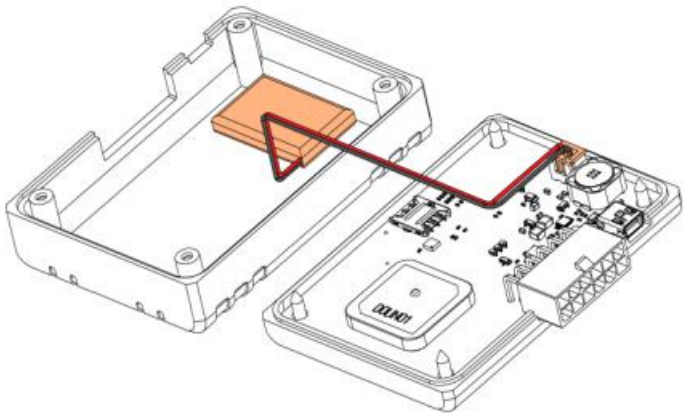


Table 2.10 Battery installation

2.8 Connecting power supply

Cables seated on the device board are used for connecting the navigation tracker to power supply. In order to protect the power wires from short circuit failures, it is strongly recommended to install a fuse with a rated current of 1 A as close as possible to the power source.

When connecting the tracker, safety regulations for vehicle maintenance must be strictly observed. All the connections must have reliable contacts and be thoroughly insulated. If the length of an available wire is insufficient, the wire can be extended with another wire (cross-section at least 0.35 mm^2).

The power inlet of the controller is rated for the on-board vehicle network voltage of 8 to 40 V. In order to provide power supply to the tracker, one can connect it either directly to the battery or to the on-board vehicle network (Figure 2.11). In UMKa311 power supply is connected by inserting into OBD slot.

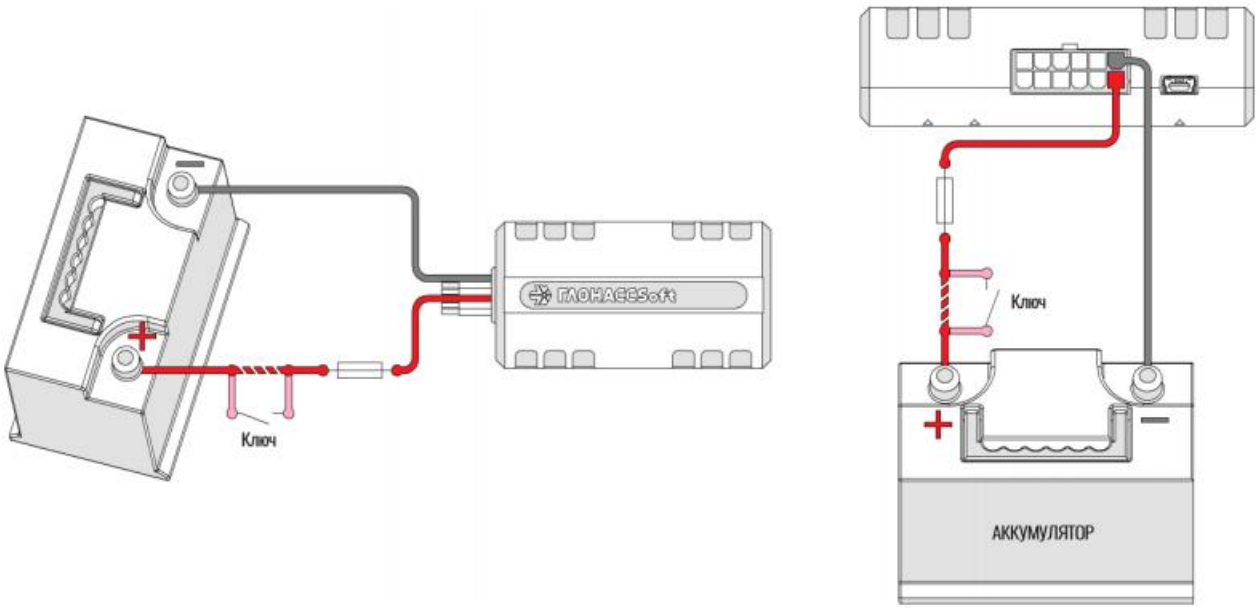


Figure 2.11 Connecting power supply (310 – on the left; 312 - on the right)

Attention! The tracker itself has built-in protection from short-circuits, power supply polarity reversals and pulse overvoltage. However, due to the naturally limited resource of the protection installed, it is strongly recommended to use an external fuse with a rated current of 1 A.

2.9 Connecting analog input

The analog input of the tracker is used for monitoring vehicle parameters by utilizing analog data (from an analog fuel level sensor, an analog thermometer, etc.).

The analog input can also operate as a discrete one with adjustable voltage levels of the logical high and low (see “Configurator operation” section).

The tracker has one channel for the measuring of external voltage (AIN0). AIN0 channel can take measurements within the range of 0 to 40 V.

In UMKa311 virtual input is implemented. It is connected via OBD slot.

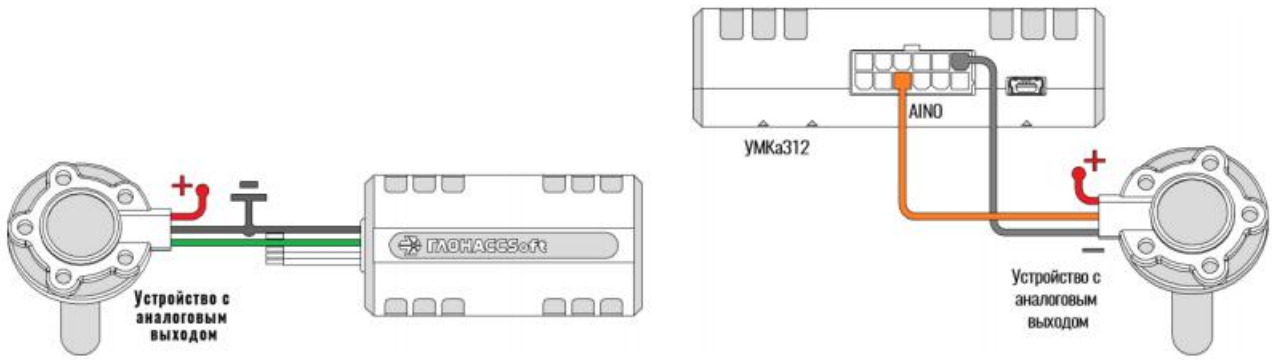


Figure 2.12 Connecting analog sources (310 – on the left; 312 - on the right)

To connect the analog input in the mode of a discrete input with a pull-up to VDC, comply with the circuit diagram in Figure2.13, in doing so one must use an additional pull-up resistor of 3.9 kΩ with the power dissipation factor of at least 0.5 W.

The following elements can act as a switch: relay contacts, sealed contacts, and other devices with the "dry contact" or "open drain" outputs.

To connect the analog input in the mode of a discrete input with a pull-up to GND, comply with the circuit diagram in Figure 2.14.

When connected, perform the setting of input modes in the configurator (ref. “Configurator operation” section).

The conversion of an analog input signal into a discrete one is implemented in accordance with the principle of the Schmitt trigger.

The switching thresholds are set in the configurator or by means of the "SETLIMn" command (where “n” is the input number). For example, the default thresholds are as follows: voltage for the logical low is 5 V (5000 mV), voltage for the logical high is 6 V (6000 mV). An input signal with a voltage below 5 V is converted to the logical low, above 6 V - to logical high, and within 5 to 6 range it retains the last registered value (Figure 2.15)

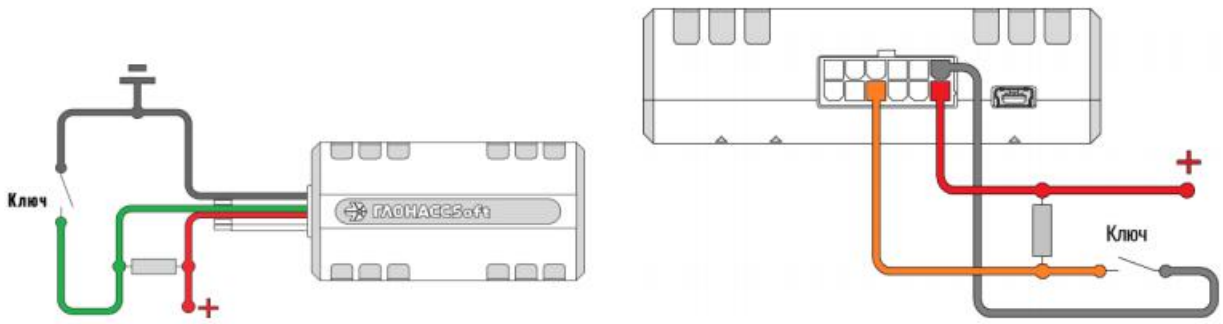


Figure 2.13 Connection with a pull-up to VDC (310 – on the left; 312 - on the right)

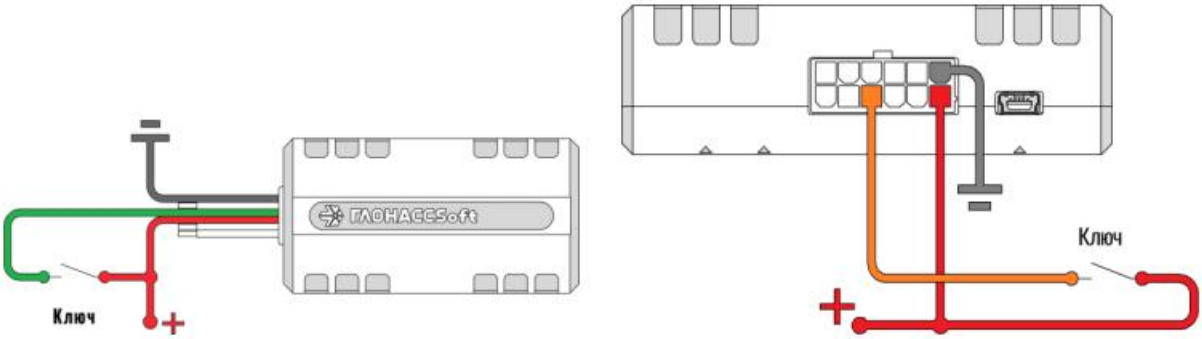


Figure 2.14 Connection with a pull-up to GND

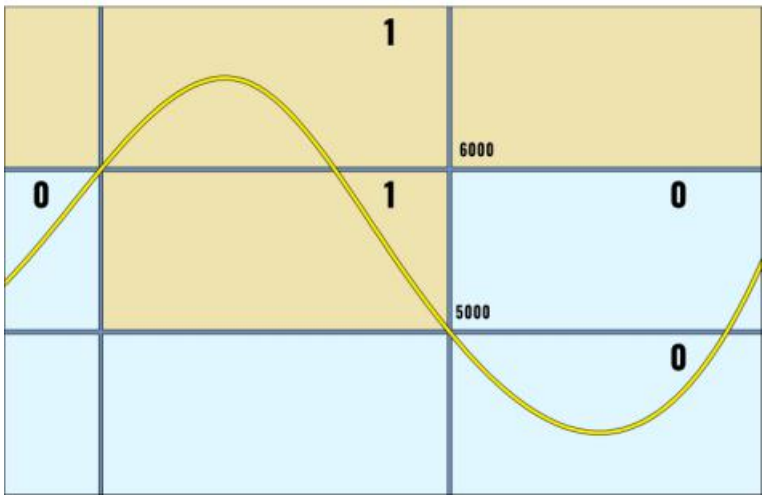


Figure 2.15 Converting analog signal into discrete

2.10 Connecting digital input

The digital input of the tracker is used for connecting discrete sensors. One can adjust operating modes of this input using the configurator.

The digital input has an internal pull-up to GND, and so devices with "dry contact" or "open drain" outputs connected to VDC can act as signal sources (Figure 2.16).

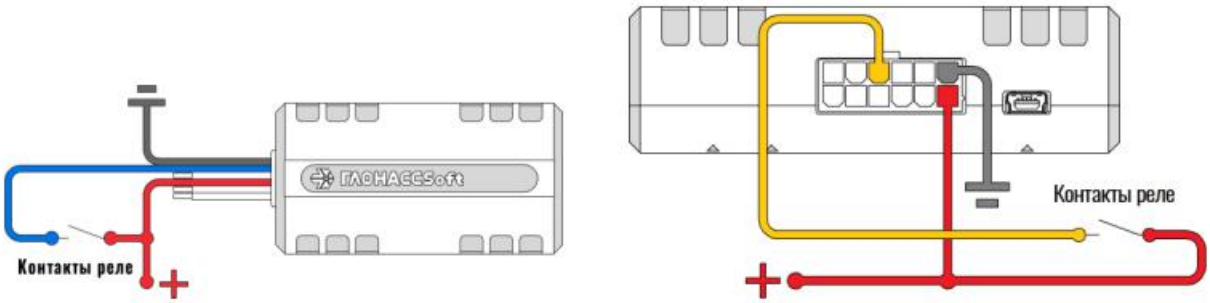


Figure 2.16 Connecting discrete sensors

2.11 Connecting “open drain” output

The tracker has an "open drain" output that can be used to control the external load. In UMKa310 version it overlapped with the digital input.

If the load to be controlled consumes no more than 0.5 A, then to connect it comply with the diagram in Figure 2.17.

To connect the loads consuming more than 0.5 A, use an additional relay (Figure 2.18).

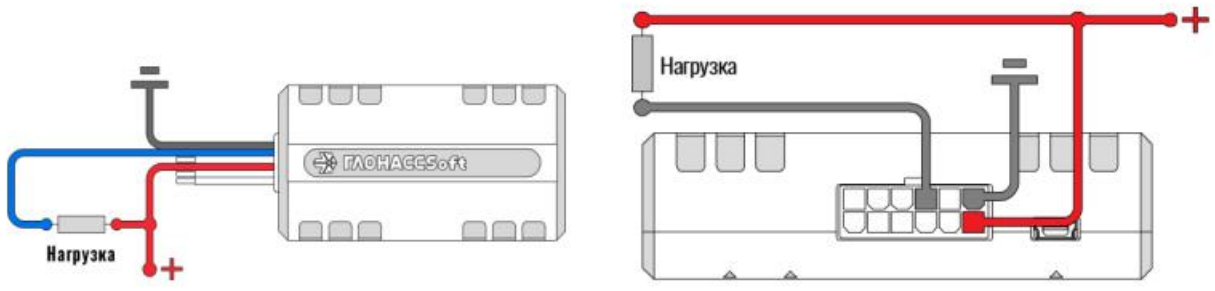


Figure 2.17 Connecting low-power load

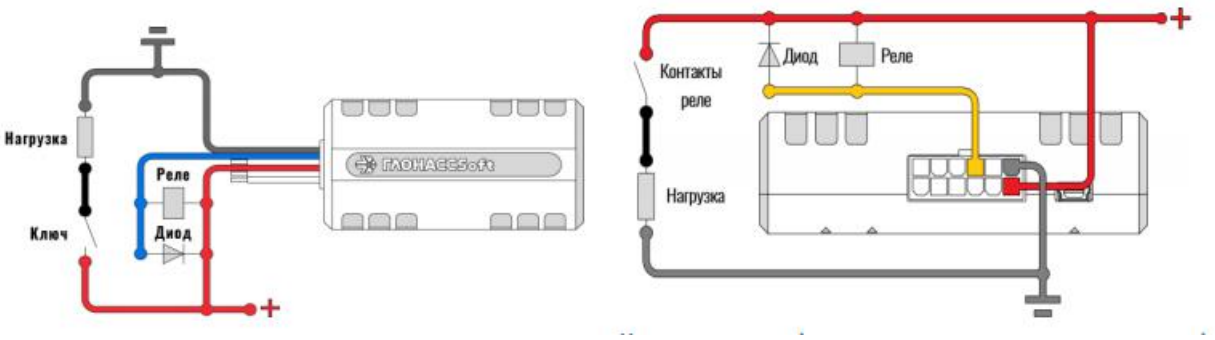


Figure 2.18 Connecting high-power load

Attention! To protect the tracker output from the self-inductance EMF, which occurs at switching inductive loads (for example, a relay coil), use a fly-back diode. This diode must have the peak inverse voltage higher than the load supply voltage and a forward current higher than the current consumed by the load.

2.12 Connecting FLS to RS-485

Up to three LSS Fuel Level Sensors (FLS) can be connected to the UMKa310.R, UMKa310.BR, UMKa310.BRH, UMKa312.R2 trackers configuration.

In Figure 2.19 find an example of connecting FLSs. The resistance at the end of the bus is installed to match the impedance and is equal to 120 Ω. For the RS-485 bus, the recommended cable type is a “twisted pair”.

RS-485 bus stubs should be as short as possible to match bus impedance. In order to prevent bus collisions, assign each device a unique address in advance.

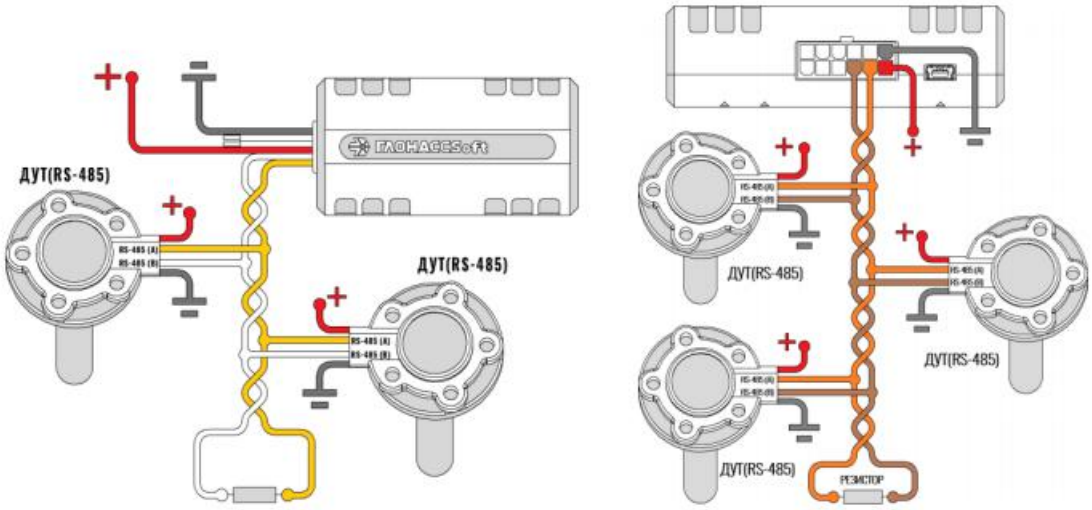


Figure 2.19 Connecting FLS via RS-485 interface

Attention! While working with fuel level sensors, one must strictly adhere to the requirements of the relevant maintenance manuals.

2.13 BLE FLSs connection

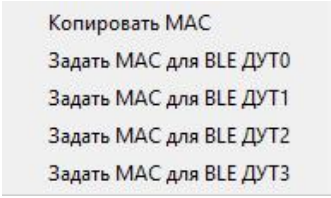
This function is not available in versions UMKa310 and UMKa310R!

In addition, up to 4 wireless ESCORT TD-BLE FLSs (or other BLE FLSs given in Appendix F) can be connected to wired FLSs (Figure 2.21).

To start work with BLE FLSs go to configurator in «Systems» tab and in group of parameters «Bluetooth parameters» choose «BLE FLSs» in dropdown menu (BLEMODE 2) and «Configuration and BLE FLSs» (BLEMODE 3). After enter configuration into the terminal.

To add FLSs onto the terminal enter MAC address into correspondent field or use the command «LLSBLEn» in «BLE FLSs» tab. To receive data put a tick in « Poll» field.

There is a BLE CAN scanner in configurator for getting MAC address of the device. Press «Device search», and the terminal will find all available Bluetooth. With right button press onto the needed device and in appeared window choose FLS number (Figure 2.20).



Copy MAC
Set MAC for BLE FLS0
Set MAC for BLE FLS1
Set MAC for BLE FLS2
Set MAC for BLE FLS3

Figure 2.20 Choose the number of FLS

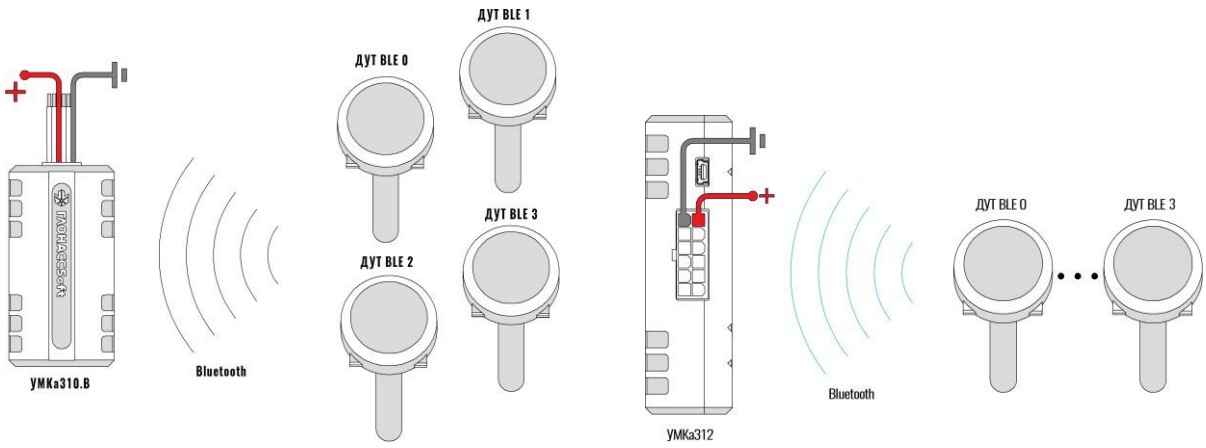


Figure 2.21 Connection of FLS via BLE (UMKa310 – on the left; UMKa312 - on the right)

Values from wireless FLSs are integrated into general address space following 3 wired FLSs. Addressing of FLSs starts from 7.

For wireless FLSs the information about supply voltage and signal level is given in «State» tab. Also signal level and supply voltage are entered into black box and can be read by configurator when reading the history. On telematic server additional parameters of signal level and battery voltage is not supported.

2.14 UMKa310/311 power manager

The power manager is designed to optimize power saving modes of the tracker.

While operating, the tracker can be in one of the power saving modes specified in 2.7.

Table 2.7 Power saving modes

Mode	Switch condition	Tracker behaviour
Run mode (RUN)	- The conditions for switching to other power saving modes are not met.	- The tracker is fully functional. Consumption at a voltage of 12 V – from 30 to 70 mA.
Idle mode (IDLE)	- The voltage on the analog input is lower than the specified by the command (VOLTSAVE Z). - The tracker is in the static navigation mode for the period longer than specified (POWERSAVE Y).	- The modem is disconnected from the server (OFFLINE). In OFFLINE mode, the modem stays registered in the cellular network and processes incoming SMS and voice calls. - LED indication is turned off. Consumption at a voltage of 12 V – 30 mA.
Standby mode (STANDBY)	- The tracker is in the static navigation mode for the period longer than specified (POWERSAVE X). - The voltage on the analog input is lower than the specified by the second parameter of “VOLTSAVE Y” command.	- The modem is completely disconnected (SLEEP). - LED indication is turned off. - Navigational receiver is turned off. - No by-time recordings in the black box. - The rest of the operations function in a normal mode. Consumption at a voltage of 12 V – 15 mA.
Activity window (WINDOW)	In this mode, the terminal switches to the RUN mode from any other power saving mode.	Start time and duration of the activity window is set by “ACTIVEWIN” command. When the window ends, the terminal switches to a power saving mode.

2.15 UMKa312 power manager

The power manager is designed to optimize power saving modes of the tracker. While operating, the tracker can be in one of the power saving modes specified in 2.8.

Table 2.8 Power saving modes

Mode	Switch condition	Tracker behaviour
Run mode (RUN)	- The conditions for switching to other power saving modes are not met.	- The tracker is fully functional.
Idle mode (IDLE)	-The tracker works from the battery for the period longer than specified (DISCHARGE Y); - The tracker is in the static navigation mode for the period longer than specified (POWERSAVE Y); -The voltage on the analog input is lower than the specified by the command (VOLTSAVE Z).	- The modem is disconnected from the server (OFFLINE). In OFFLINE mode, the modem stays registered in the cellular network and processes incoming SMS and voice calls. - LED indication is turned off. Consumption at a voltage of 12 V – 30 mA.
Standby mode (STANDBY)	- The tracker is in the static navigation mode for the period longer than specified (POWERSAVE X). - The voltage on the analog input is lower than the specified by the second parameter of “VOLTSAVE Y” command.	- The modem is completely disconnected (SLEEP). - LED indication is turned off (except for LED indicator) - Navigational receiver is turned off. - No by-time recordings in the black box. - The rest of the operations function in a normal mode.
Activity window (WINDOW)	In this mode, the terminal switches to the RUN mode from any other power saving mode.	On UTC start time and duration of the activity window is set by “ACTIVEWIN” command. When the window ends, the terminal switches to a power saving mode.

During activity period the tracker can be in one of the main power supply modes represented in Table 2.9.

Table 2.9 Power supply modes

Mode	Switch condition	Tracker behaviour
Battery recovery mode	- The battery is completely discharged or not connected	- Removal of the battery from deep discharge - after complete charge (more than 3.3V) the tracker switches into slow charging mode
Battery slow charge mode	-It is characterized by the possibility of switching to battery work on condition of turned off power voltage	- The maximum voltage of charged battery in this mode is about 4.0 – 4.1 V that corresponds to 80 – 90 % charge; - From this mode it is possible to switch to fast battery charge mode.
Battery fast charge mode	- In this mode charge current depends on duration of the battery connection to 4.2В line.	- The battery charges to 4.2V that correponds to 100% charge.
Battery protection mode	- Short circuit failure on battery terminals is detected	- All charge circuits turn off to prevent tracker and battery damage
Battery discharge mode	-If power voltage disappears, the tracker switches to the battery power in case it is connected and in good order (DISCHARGE X,Y).	- the purpose of battery discharge mode is to prolong trackers work and save the battery.
Battery turn-off mode	-In EEPROM и FLASH memory the entries are completed. After that the tracker reboot takes place during which the terminal is turned off from the battery.	-All tasks implemented by the tracker are finished in the most correct manner. -The switch to backup mode is possible from this mode.

Backup mode	- Tracker switches to it after proper cut off on condition of power voltage absence	- The battery voltage goes only on backup circuits of GNSS module. - GNSS backup circuit power supply allows to implement «warm start» and provides the work of other technologies that reduces the time until receiving the first valid coordinates.

In power manager energy saving function by reduce of voltage level in internal and external analog channels is implemented. The setup is done by the "VOLTSAVE" command. There is also a possibility of setting activity window. This setup puts the tracker out of energy saving mode at specified time for specified duration. In combination with other power manager commands it allows to implement the beacon function. The setup is done by the "ACTIVEWIN" command.

2.16 Data transmission to several servers

The tracker can transmit data concurrently to three different telematic servers, and be updated and configured at the same time.

The black box ensures that data on the transmitted spots is independently saved to each of the three possible telematic servers. The tracker always makes records in the black box for all the servers, regardless of whether the data transmission to them is turned on in the settings or not. Yet only one copy of the data is stored in the black box.

To transfer data to a server, one should enter its address, port and select the transmission protocol via the configurator or using the "SETSERV" and "SETPROTOCOL" commands. Other settings, such as "Uploading order", "On-line mode" and "Advanced options" work for all the servers.

To disable data transmission to a server, you should clear the server name in the tracker settings. However, there is a restriction on the server selecting order. One cannot set the concurrent transmission to the first and the third ones or the second and the third ones. It is possible to set the transmission to the first (primary) server, or the first (primary) and the second (alternate) ones, or to all the three servers at the same time.

Attention! You should not set two similar servers, as this leads to the device malfunction and increases traffic! Also, adhere to the following server selecting order: Primary server → Alternate server → Auxiliary server, if the servers are set out of order, for example, primary and auxiliary servers are set, and the alternate one is skipped, then the settings of the auxiliary one will be ignored.

At logging the exchange between the tracker and the servers, the [Connection ID] field has been added to the messages about receiving and transmitting data packets. The possible connection IDs and their values are given in Table 2.10.

Table 2.10 Connection ID

Connection ID	Description
[0]	The first (primary) server
[1]	The second (alternate) server
[2]	The third (auxiliary) server
[3]	Remote update server
[4]	Remote configuration server

2.17 Remote configuration

In the remote configuration mode, it is possible to operate the remote tracker practically the same way, as if it were connected to the configurator via USB.

In the remote configuration mode, the remote control server acts as an intermediary between the configurator and the tracker. The tracker and the configurator are connected to it.

There are two possible modes of connecting the tracker to the remote control server: permanent and session.

In the permanent mode, the tracker keeps the connection to the remote control server as long as the tracker is in the "ONLINE" state. By default, the permanent mode is disabled. To enable it, use the "REMCFG ENABLE" command, to disable – the "REMCFG DISABLE" command.

In the session mode, one should send the "REMCFG START" command via any available communication channel just before starting the configuration session. At this, the tracker will stay connected to the remote control server for 30 minutes. If configuration requires

more or less time, one can also specify the duration of the session in the parameters of the "REMCFG START" command.

Switching from the session mode occurs upon the session timeout, at the tracker reboot, upon the receiving of "REMCFG STOP" command or when the tracker is switched to the power saving mode.

After the tracker has been connected to the remote control server, it becomes possible to connect the configurator to it. To do so, click on the toolbar. In the opened "Connecting to server" window, enter the tracker IMEI and password for accessing it, and then press the "Connect" button. Further work with the configurator is described in Section 3.3 and later.

It is important to understand that remote configuration is realized via the GPRS channel, which has considerable limitations in both the bandwidth capacity and transmission delay and in the connection stability as well. These features of the data channel impose limitations on the configurator performance and the implementation of some additional functions, such as debugging mode and the like.

Attention! By default, the permanent connection mode is disabled in the settings and only the session mode is available.

2.18 High priority events

High priority event is an event (message, spot) which should be transmitted to the telematic server with a minimum delay. “SOS” signal is one of the high priority events.

A high priority event can be generated at changing of the discrete inputs value and any bit of the “Status” parameter. For this purpose, set the “Discrete priority (+)” mode for discrete inputs, and also set a high priority event status mask by the second parameter of the “SETMASK” command or via the configurator in the status calculator in the “Priority” tab.

The black box holds the last 16 high priority spots. Each telematic server uses its own list of high priority spots.

A high priority spot acknowledged by a server is deleted from the corresponding list. At the tracker power turn off or restart, lists of high priority spots are cleared.

When the “From old to new” spot uploading order has been selected, the rule “Group records by” is canceled if there are any high priority spots in the queue. The spot

uploading order is not changed. A packet containing the maximum possible amount of spots at current settings is sent to a server. In this case, the first record in the packet will be the oldest one among the not acknowledged. The "Group records by" rule will come into effect again as soon as the last high-priority spot from the list of high-priority ones is acknowledged.

When the “Current first” spot uploading order has been selected, the rule “Group records by” is also canceled if there are any high priority spots in the queue.

The spot uploading order is changed this way: at first all the high priority spots are sent in the order they are received in the queue, then the current spot is added to the packet with the last high priority spot, not acknowledged spots are added last.

A packet containing the maximum possible amount of spots at current settings is sent to a server. The "Group records by" rule will come into effect again as soon as the last high-priority spot is acknowledged.

2.19 Configuring via Bluetooth

It is possible to perform tracker configuration via Bluetooth. A button with a Bluetooth icon has been added to the configurator sidebar for connecting to the tracker. The button is only active when the Bluetooth is on. At the button clicking, the search for the UMKa310 trackers will be initiated, and the connection to the one tracker found will be automatically established, if there is more than one tracker, the selection of trackers will be offered. To disconnect, press the button again. In other respects, operating via Bluetooth does not differ from operating via USB. To configure the tracker via Bluetooth the SIM card is not necessary.

2.20 Hosting protection

In "H" version trackers hosting protection is enabled. In this version the tracker is attached to certain telematic address without possibility of change.

In configurator in "Server" tab one can find data of connected server without possibility of edit.

2.21 LBS positioning

LBS positioning function is implemented. To enable data transmission that is necessary for LBS positioning use command "SETLBS 1 ". With this, the list of transmitted data onto the server of parameters will be complemented with such parameters as "mcc" - mobile country code, "mnc" - mobile network code, "lac" - local area code, "cell_id" - cell identificator. Read about setup into Wialon on the website

https://gurtam.com/ru/blog/no-satellites-lbs-service

2.22 BLE identification system (iBeacon)

BLE identification support is implemented for the tracker. The details find on the website, glonasssoft.ru, in instructions section the document "BLE identification system".

2.23 CAN connection (Only for UMKa311.C)

In UMKa311.C CAN bus support is implemented. For connecting it set the tracker into OBD slot. The terminal is configured from manufacturing plant.

Attention! CAN interface support is optional and must be stated by placing an order at the manufacturer's.

One can get familiar with the lsit of transmitted and read parameters in "Appendix I. The list of read and transmitted paramaters from CAN bus".

3 OPERATING INSTRUCTIONS

3.1 LED indication

A LED is installed on the tracker board for the tracker UMKa310/311 status specification (Figure 3.1). LED operation is described in Table 3.1.

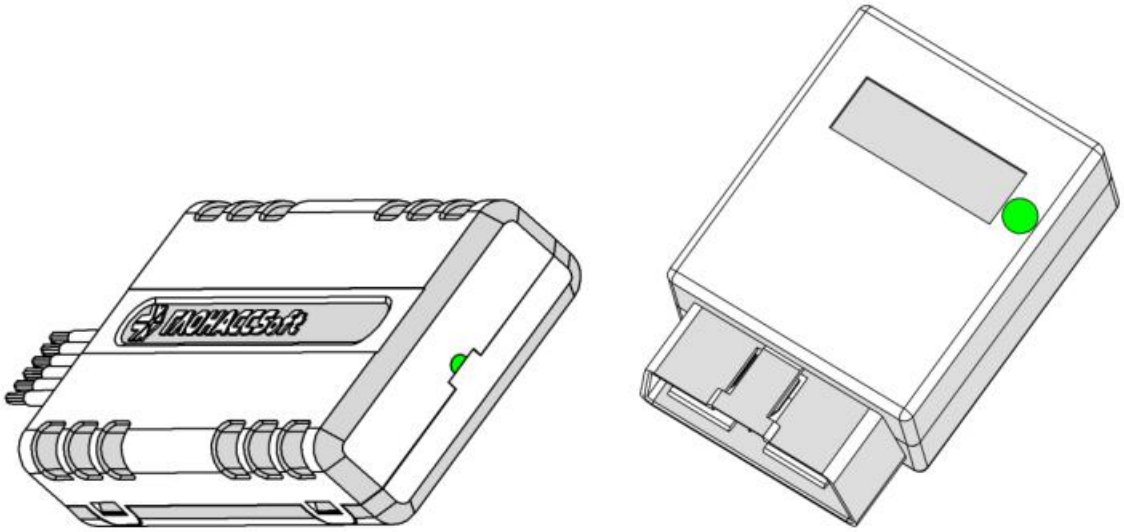


Figure 3.1 Placement of the indicating LED

Table 3.1 LED

LED	Status
Off	“Sleep” mode. The modem is off, or a modem or SIM error has occurred.
1 short flash	GSM module initialization.
2 short flashes	GSM network log on.
3 short flashes	“Offline” mode. The modem receives SMS and voice calls only.
4 short flashes	GPRS logging in. GPRS logging out.
3 short pauses	“Online” mode. No connection to the both servers.
2 short pauses	“Online” mode. No connection to the alternate server.
1 short pause	“Online” mode. No connection to the primary server.
Steady On	“Online” mode. Both the primary and the alternate servers are connected.

Attention! Remote update and remote configuration have no LED indication.

For detection of UMKa312 current location there are three LEDs on its board. They are situated behind the main connection slot and illuminate it during work (Figure 3.2).

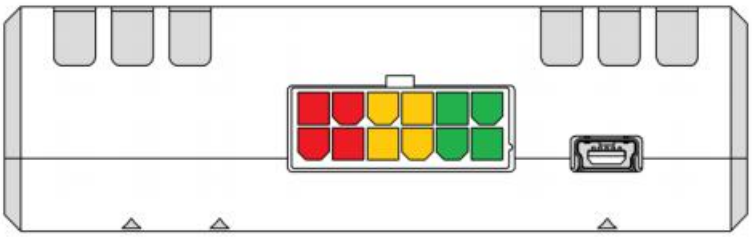


Figure 3.2 Placement of the indicating LED

Each LED is responsible for the state of separate tracker modules

Table 3.2 LED

LED	Status
Green - power supply availability indication	
On	Power supply is availiable
Off	No power supply
Yellow - GSM module indication	
Off	“Sleep” mode. The modem is off, or a modem or SIM error has occurred.
1 short flash	GSM module initialization
2 short flashes	GSM logging in.
3 short flashes	“Offline” mode. The modem only receives SMS and voice calls
4 short flashes	GPRS logging in. GPRS logging out
3 short pauses	“Online” mode. No connection to both servers
2 short pauses	“Online” mode. No connection to the alternate server
1 short pause	“Online” mode. No connection to the primary server

Steady On	“Online” mode. Both the primary and the alternate servers are connected.
Red - GNSS module indication	
Off	GNSS module is out of order
Flashes 1 time	Invalid coordinates. Satellites search
Flashes 2 times	2D-coordinates are detected
Flashes 3 times	3D-coordinates are detected

Attention! Remote update and remote configuration have no LED indication as they are background or auxiliary.

3.2 Preparing a PC for the tracker configuration

To configure the tracker, use a PC running Windows 7 or higher. Download the «UMKa3XX Configurator» installer from the manufacturer official website at https://glonasssoft.ru/ru/equipment/umka310

To start the installation run the downloaded file and allow changes (Figure 3.3).

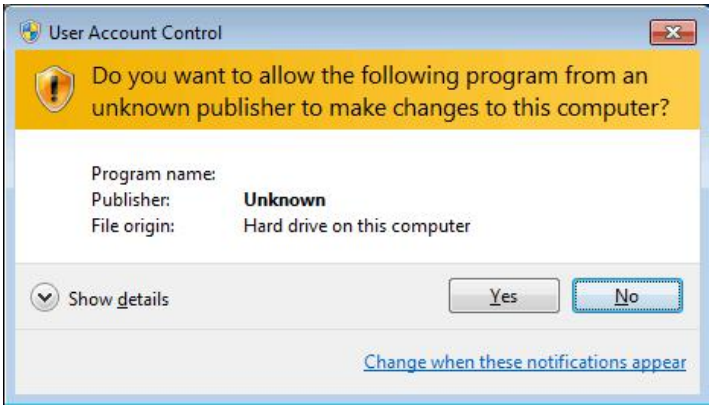


Figure 3.3 Allowing changes

Select the installation language (Figure 3.4) and click "OK".

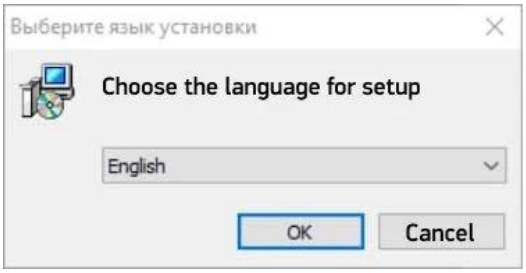


Figure 3.4 Selecting installation language

Select the installation path (Figure 3.5) and click "Next".

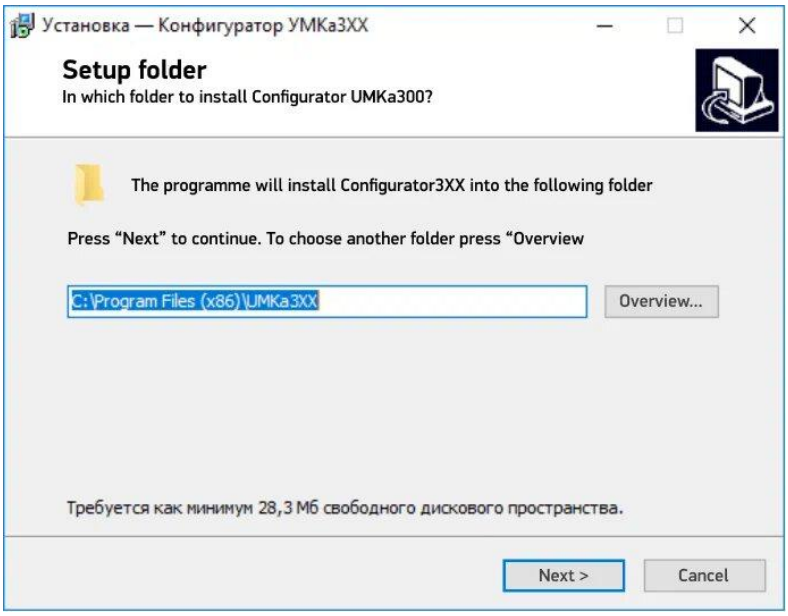


Figure 3.5 Setting installation path

When installing for the first time, select the option "Install the tracker driver" (Figure 3.6) and click "Next".

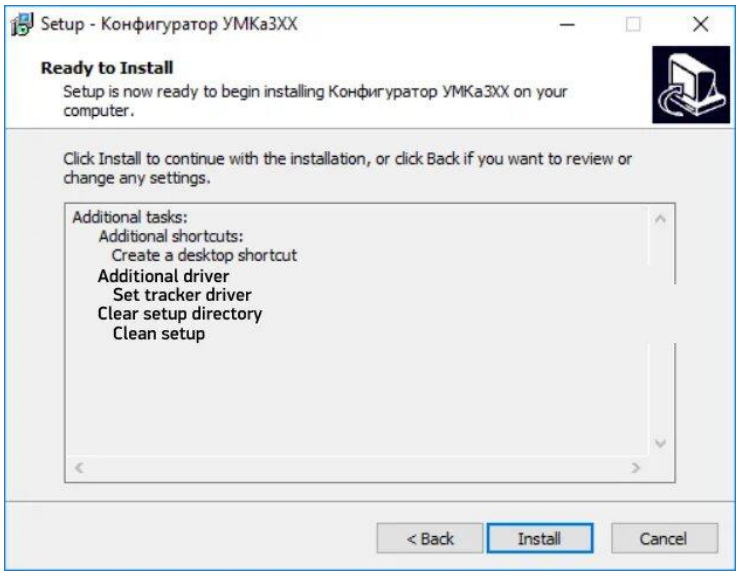


Figure 3.6 Selecting installation options

The program is ready for installation, click the “Install button” (Figure 3.7).

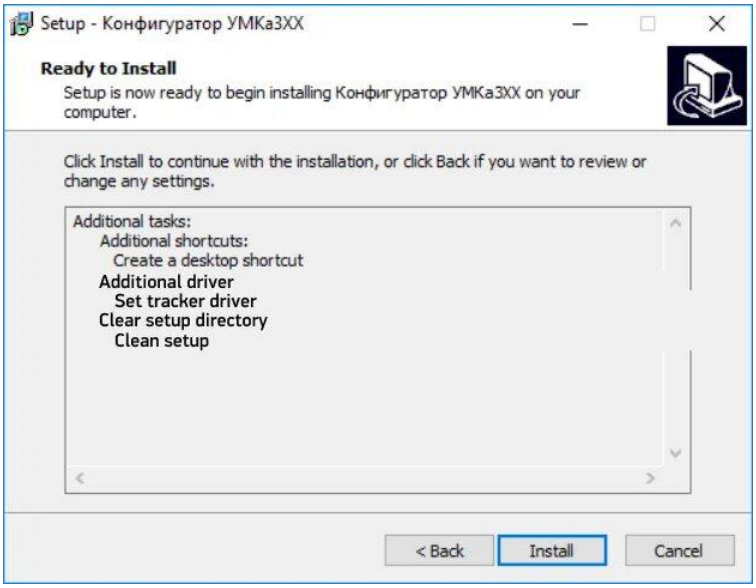


Figure 3.7 Ready to install

After the installation is completed, you can immediately start the configurator by selecting the option "Start Configurator UMKa3XX" (Figure 3.8).

Figure 3.8 Starting the application

3.3 Operating the configurator

Connect the tracker to a PC using USB cable(USB A – micro-B for UMKa310, UMKa311; USB A – mini-B for UMKa312).

The cable is not included in the package, and it is purchased separately.

Attention! The tracker should not be connected to a PC via USB for configuration without power supply. It is obligatory to connect an external power supply.

If the configurator cannot find the tracker, check whether the drivers have been installed. If there are no drivers, it is recommended to reinstall the configurator checking the box “Install drivers” (Figure 3.6).

To start the application, go to "Start" → "All Programs" → "Configurator UMKa3XX." The startup window of the configurator (Figure 3.9) opens, it can be conventionally divided into four zones: Status panel (1), Toolbar (2), Settings tree (3) and Data display window (4).

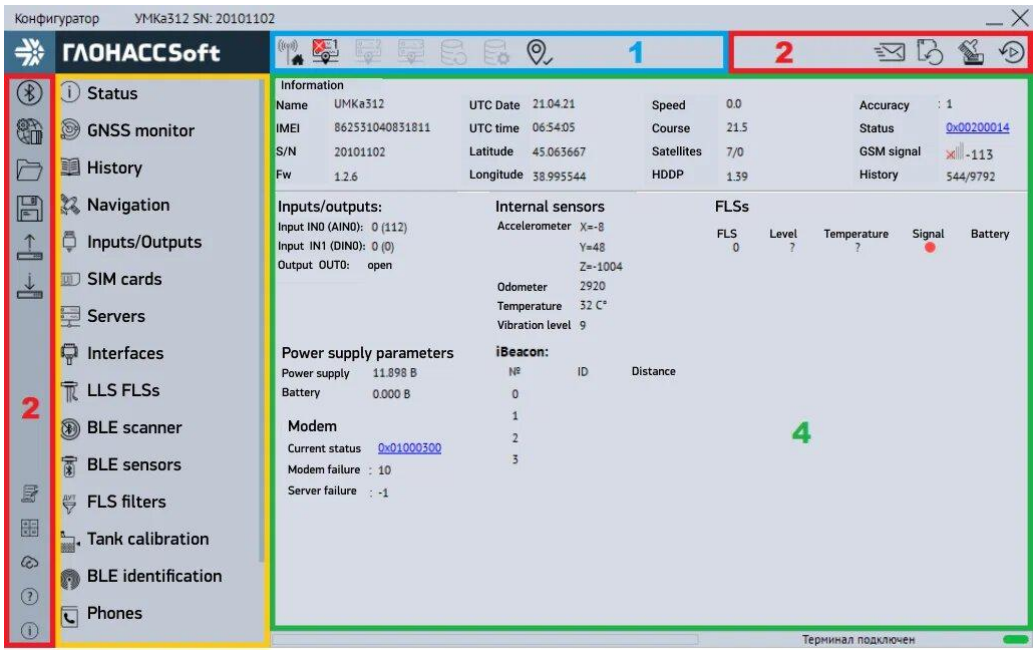


Figure 3.9 Startup window “Status”

At startup, the configurator connects to the update server and checks for updates for the configurator and the tracker firmware.

If there is an available configurator update, a window with the information about the version of the update will appear (Figure 3.10). Click "Yes" to download the update. The update will be downloaded and installed automatically, and then the program will be restarted.

You can also check for updates manually, by clicking the "Check for updates" icon on the toolbar.

Attention! To ensure steady operation of the tracker, one should always update the tracker to the latest firmware version.

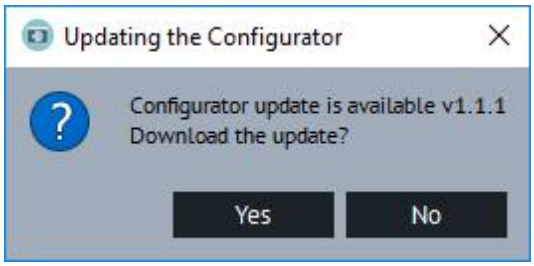


Figure 3.10 Updating the configurator

Attention! If any problems with the configurator auto-update occur, try running the configurator as an administrator. To do so, right-click the "UMKa3XX Configurator" shortcut and select "Run as administrator" in the opened context menu.

Other functions of the toolbar and status icons are described.

Table 3.3 Toolbar and status icons

Icon	Function
	Open a configuration file
	Save a configuration file
	Remote configuration
	Read a configuration from the tracker
	Write a configuration into the tracker
	Reconnect the tracker
	Update the tracker firmware. When updates are available, icon gets darker
	Cleaning the tracker memory. Enables erasing of the user settings and the “black box”
	Reboot the tracker
	Status calculator
	Check for updates
	Help (operating manual)
	About program
	Roaming (Guest Network/Home Network)
	Connection to the primary server (Link up/Link down)
	Connection to the alternate server (Link up/Link down)
	Connection to the auxiliary server (Link up/Link down)
	Connecting to update server

	Coordinates (Not valid / Fixed / Valid)
	Connecting to configuration server
	Bluetooth (Off/On)

To view and edit tracker settings, use the settings tabs (Figure 3.9). When clicking a tab in the data display window, one can view the corresponding values and settings and edit them.

For remote configuration, click “Remote configuration” icon in the upper left of the configurator, enter the tracker password and IMEI in the popup window, then click "Connect" button. Further, operating the configurator does not differ from configuring via USB.

To write the changed settings into the tracker, use “Write a configuration into the tracker” icon.

When configuring several trackers, to speed the procedure up one can save the configuration of the first tracker to the file by clicking “Save a configuration file” icon; and then load the settings into the next trackers by clicking “Open a configuration file” and “Write a configuration into the tracker”.

For help information click “Help” icon on the toolbar.

To view information about the configurator, click "About Program" icon on the toolbar.

3.4 Mobile configurator

In order to operate the mobile configurator, download the “UMKa3XX Configurator” from the “Play Market” (https://play.google.com/store/apps/details?id=ru.glonasssoft.configurator3xx) and install it on an Android phone with OS version 4.1 or higher.

Open the application and in the window appeared click “Tracker search via Bluetooth”. The application will automatically turn the Bluetooth on and show the list of available trackers. Select the tracker you need in the list appeared (Figure 3.11).

Figure 3.11 List of available trackers

After the configuration has been read, you will get to the status window displaying tracker general information, status of inputs/outputs, external and internal sensors.

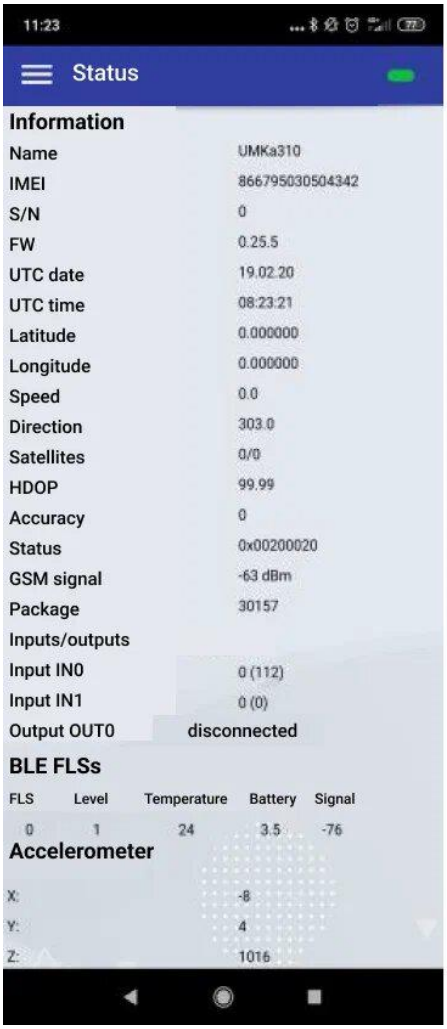


Figure 3.12 “Status” window

By clicking the button in the left upper corner, you can call the tab selecting bar (Figure 3.13).

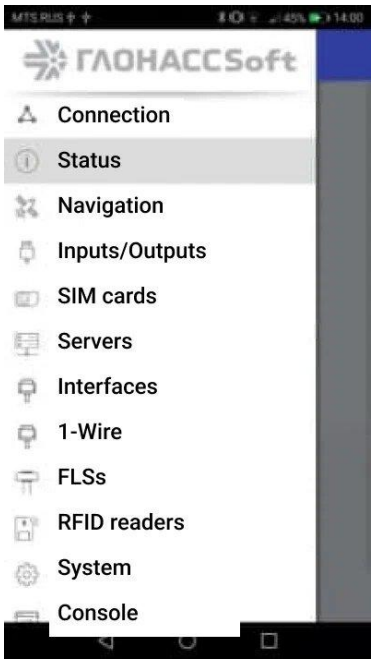


Figure 3.13 Tab selecting bar

When selecting the tracker control bar, you can call the bar corresponding to the toolbar from Windows configurator version described in Section 3.3.

Figure 3.14 “Tracker control” bar

In other respects, operating the mobile configurator does not differ from operating the Windows configurator.

3.5 “Status” tab

Tracker general information, status of inputs/outputs, external and internal sensors are displayed in the "Status" tab (Figure 3.9).

Tracker general information is at the top of the data display window. Here one can see the tracker serial number, its name and IMEI, the current firmware version and navigation information. In the "Validity of coordinates" line two values can be displayed: 0 - coordinates are not valid, and 1 - coordinates are valid.

By clicking on the value displayed in the "Status" line, one can open the "Status calculator" window (Figure 3.15) displaying explanation of the tracker status (active SIM card number, coordinate fixation status, “black box” status, battery status, etc.). You can also call the status calculator by clicking on the "Status Calculator" icon on the toolbar.

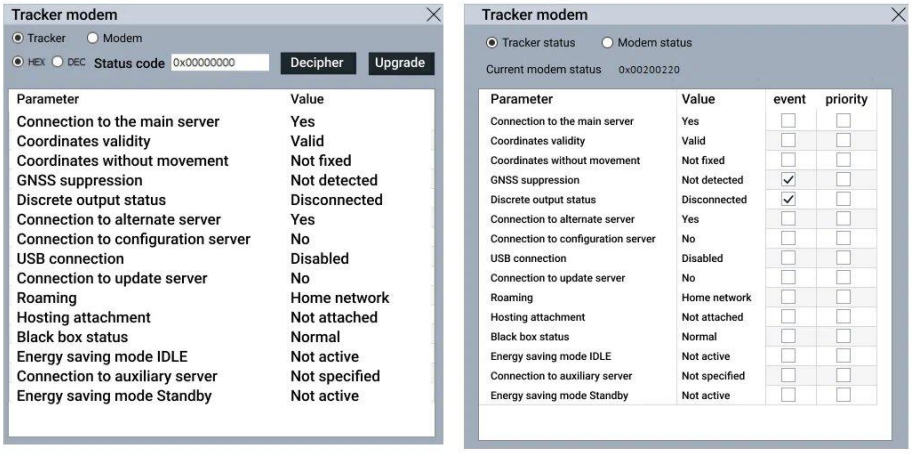


Figure 3.15 Status calculator

3.6 "GNSS-monitor" tab

In "GNSS-monitor" tab the information on satellites, their location and quality of signal is represented. It is used for control over mounting and debugging of the tracker.

Satellites are represented in pictures with columns. The completeness of a column and figures above mean the level of satellite signal. The figures below mean the number of satellite. Handwriting in bold mean the satellites that are being estimated. Colour of column: satellite type. Blue - GPS; Red - GLONASS; Green - WAAS.

On satellite map in the sky the location of satellites in relation to the tracker is represented in pictures. Straight lines refer to location of satellite horizontally to the north from above. Circles refer to satellite altitude: the farther from the center, the higher.

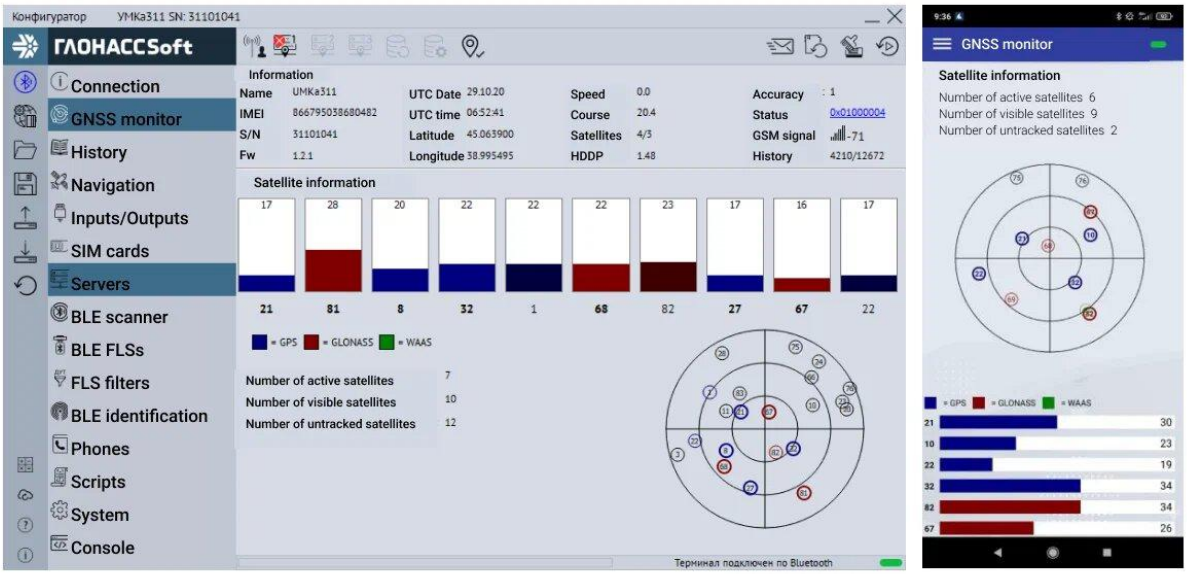


Figure 3.16 "GNSS-monitor" tab

3.7 “History” tab

In the “History” tab (Figure 3.17), the history stored in the black box is displayed. Use a mouse or a scroll bar to scroll the history. New records are added to the end of the table, the old ones – to the beginning. By double-clicking the parameter cell, open the status calculator with the parameter explanation. By clicking the “Export to CSV” button, you can save the history to the CSV file.

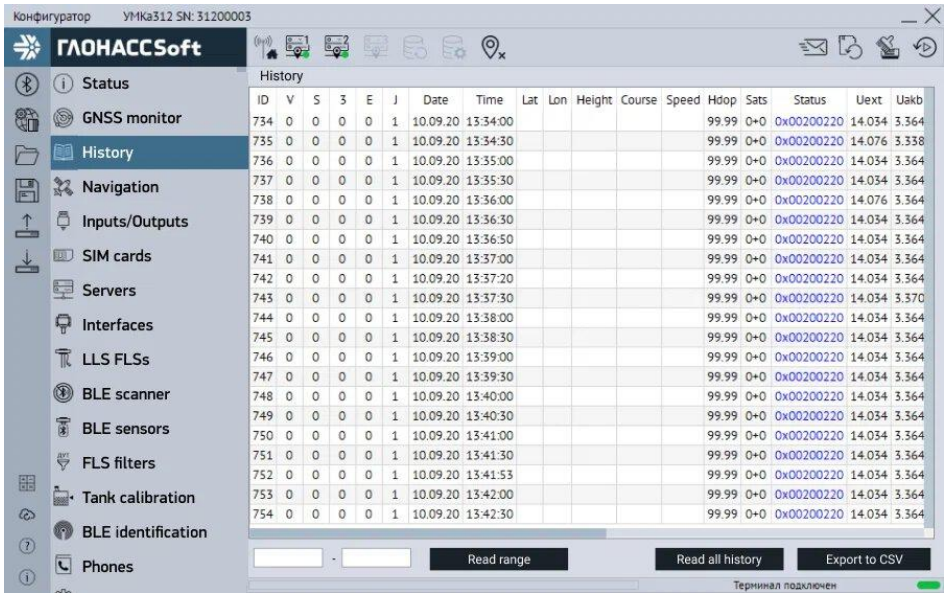


Figure 3.17 “History” tab

3.8 “Navigation” tab

To set the route tracing quality and the spot recording periods, use the "Route tracing" option group in the “Navigation” tab (Figure 3.18). Please note, that the higher the tracing quality gets, the more GPRS-traffic increases. This may entail additional communication costs (in accordance with the operator tariffs).

The "Minimum speed" option is for setting the speed value, exceeding of which assumes the vehicle is in motion.

The "Angle in degrees" option is for setting the value of the steering angle, exceeding of which leads to recording the next track spot.

The "Distance" option is for setting the value of the maximum straight-line driving distance between track spots, exceeding of which leads to recording the next track spot.

The "Acceleration" option is for setting the value of the acceleration, exceeding of which leads to recording the next track spot.

The “Minimum between spots, m” is for setting the minimum space between spots in metres, exceeding of which leads to recording the next track spot. It is used for traffic optimization.

In the tracker the estimation of minimum distance between the spots taking into account their HDOP is implemented. For each spot on the basis threshold value is calculated. For HDOP < 1 coefficient 2.5*HDOP is used, in other cases coefficient 5.0*HDOP is applied. The sum of HDOP spots with coefficient defines the distance between them. The setup of minimum distance between the spots specified by parameter "B" of "TRACK" command in the same manner keeps on functioning. The tracker automatically chooses the biggest value between the specified command and calculated on the basis of HDOP.

The "Dynamic angle" option is for setting the maximum auxilliary angle in degrees that functions by low speed of the vehicle. It helps reduce track evasion connected to gaging error of coordinates, and also reduce the number of transmitted spots. The figure of dependency of dynamic angle on speed is represented in Figure 3.19. Be default, "Dynamic angle" is disabled.

The option "Recording period setting" is for setting the maximum period between spot recordings in the moving and parked vehicle.

Option group "Static Navigation" allows positioning of the vehicle at stops. This helps to filter the "coordinates crowding" or "stars" arising out of navigational errors of the GNSS module, and eliminate redundant GPRS traffic.

The vehicle stop can be detected in two ways: using built-in accelerometer or reading the discrete input status.

The "Positioning by accelerometer" option enables the mode wherein positioning is

performed using the accelerometer. When the option is checked, the "Vibration threshold" and "Mode switching timeout, sec" options become available.

The "Vibration threshold" option is for setting the vibration level, which can be a guaranteed sign of the vehicle engine operation. 1000 units correspond to the vibrational acceleration of 1g.

The "Mode switching timeout, sec" option specifies the time of switching to the positioning mode after the vibration level is reduced below the set threshold.

The "Activation for input from static mode" setting the number of threshold elevation activation that must occur during 60 seconds for returning into static navigation mode.

The "Positioning by the input" option enables the mode of positioning by the logical level on one of the inputs. When the option is checked, the options "Input for static navigation" and "Logical level of input" become available.

The "Input for static navigation" option is for setting the number of the input used for detection of the vehicle engine operation.

The "Logical level of input" option is for setting the logical level of the signal that the input receives when the vehicle engine is stopped.

Attention! If the “Positioning by the input” option is on, then the input selected in the “Input for static navigation” option should be set as a “Discrete” one in the “Inputs/Outputs” tab!

When the static navigation mode is configured by the digital input and the static navigation by accelerometer is enabled, the positioning is performed only if both channels register the parking mode. Thus, positioning is not performed if the ignition is off and the vibration level is higher than the set one, and vice versa.

The "Validity of coordinates" option group is for setting the validity of the coordinates. The validity (i.e. reliability of coordinates) is determined on the basis of the number of visible satellites and the HDOP level (horizontal dilution of precision depending on the location of the satellites in the sky).

The "Maximum HDOP" option is used for setting the maximum HDOP value. When it is exceeded, the coordinates will be transmitted as invalid regardless of the number of visible satellites.

The "Max. HDOP at min. satellites" option is for setting the maximum HDOP value; when exceeded, the coordinates will be transmitted as invalid if the number of satellites is less than the one set in the" Minimum number of satellites "option.

The "Minimum number of satellites" option is for setting the minimum number of satellites, below which the coordinates will be transmitted as invalid if the HDOP level is higher than the one set in the "Max. HDOP at min. satellites".

Group of options "Track smoothing» has a parameter "Filtration coefficient" that detect track smoothing with Kalmar filter. Parameter is from 1 to 100. By 0 filter is turned off. Real coefficient of smoothing is multiplied on parameter HDOP. Thus with good HDOP smooting reduces, and vice versa, with bad one it increases. Coefficient of smoothing should be chosen regarding of the vehicle. With big values wider going outs from driveway at turnings at high speed start to appear.

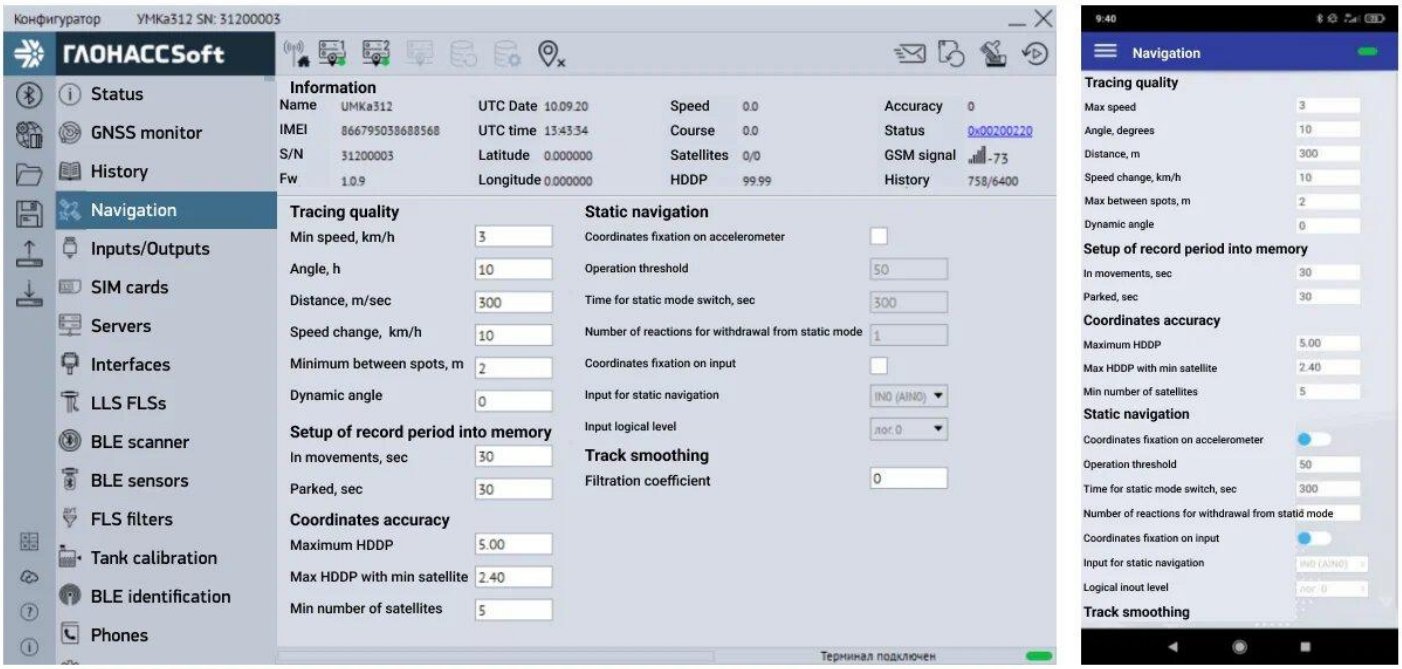


Figure 3.18 "Navigation tab"

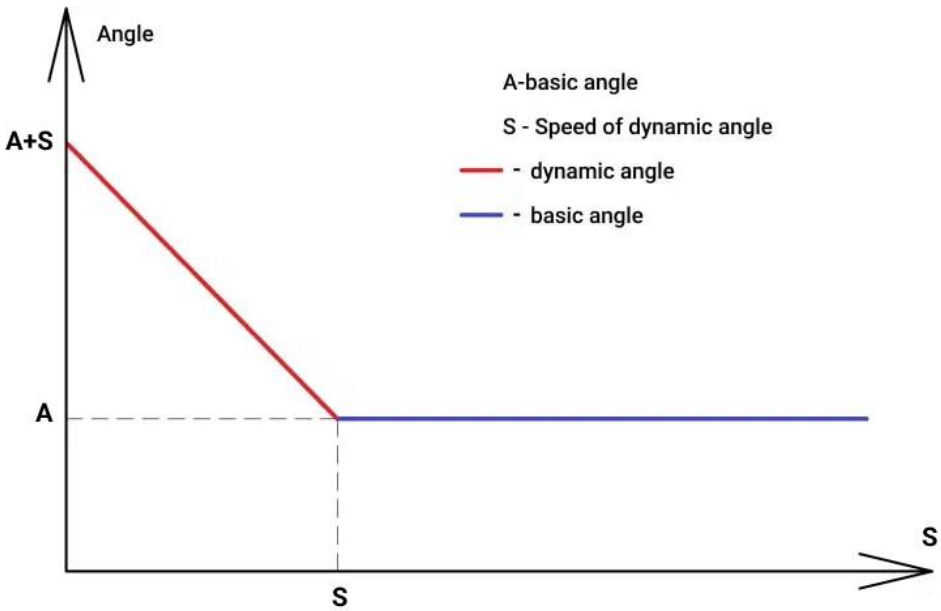


Figure 3.19 Graphic of dinamic angle dependency on the speed

3.9 “Inputs/Outputs” tab

The “Inputs/Outputs” tab is used for configuring the inputs (Figure 3.20). The “Discrete (+)”, “Analog” and “Analog FLS” modes are available for the analog inputs. In the “Discrete input with a pull-up to VDC” mode the levels of the logical high and logical low (ref. Section 2.9) are set within the range of 0 to 40000 mV. The level of the logical low cannot be higher than the level of the logical high. In “Priority discrete (+)” mode an unsheduled event is recorded by enabling discrete unput that is configured in this manner into black box and the server. When choosing “Analog FLS” there is a possibilty to set up filtration parameters, specify minimum and maximum range of FLS input signal.

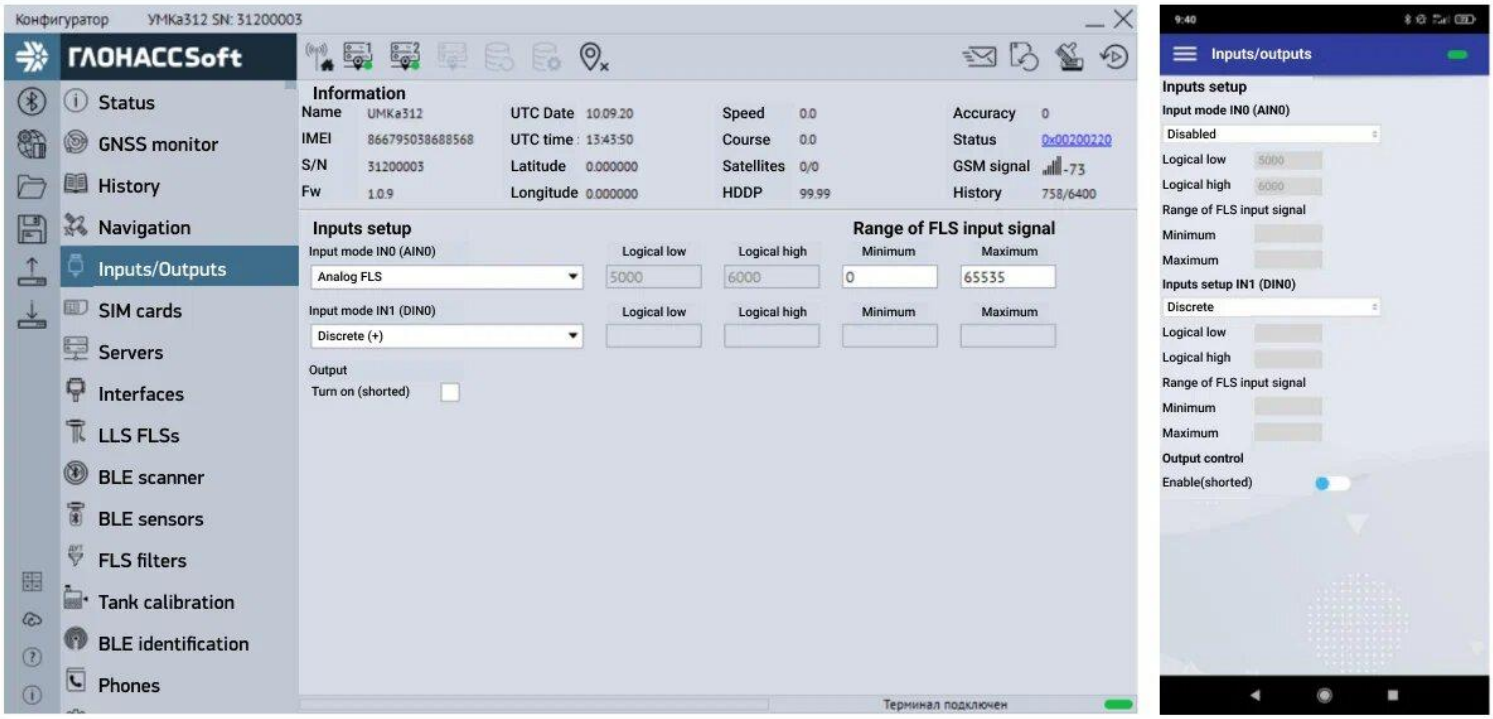


Figure 3.20 “Inputs/Outputs” tab

3.10 “SIM cards” tab

It is possible to install one SIM card in the tracker. To configure SIM card access (PIN) and GPRS connection, use “SIM cards» tab (Figure 3.21).

All the Internet access information (APN, login, password) can be obtained from the mobile operator. For the widespread operators, one can select a fitting profile, which settings are automatically loaded.

If there is a need to use the SIM card in the roaming mode, check the "Enable roaming" option.

Attention! Tracker operation in roaming can entail additional expenditures according to the tariff of the operator!

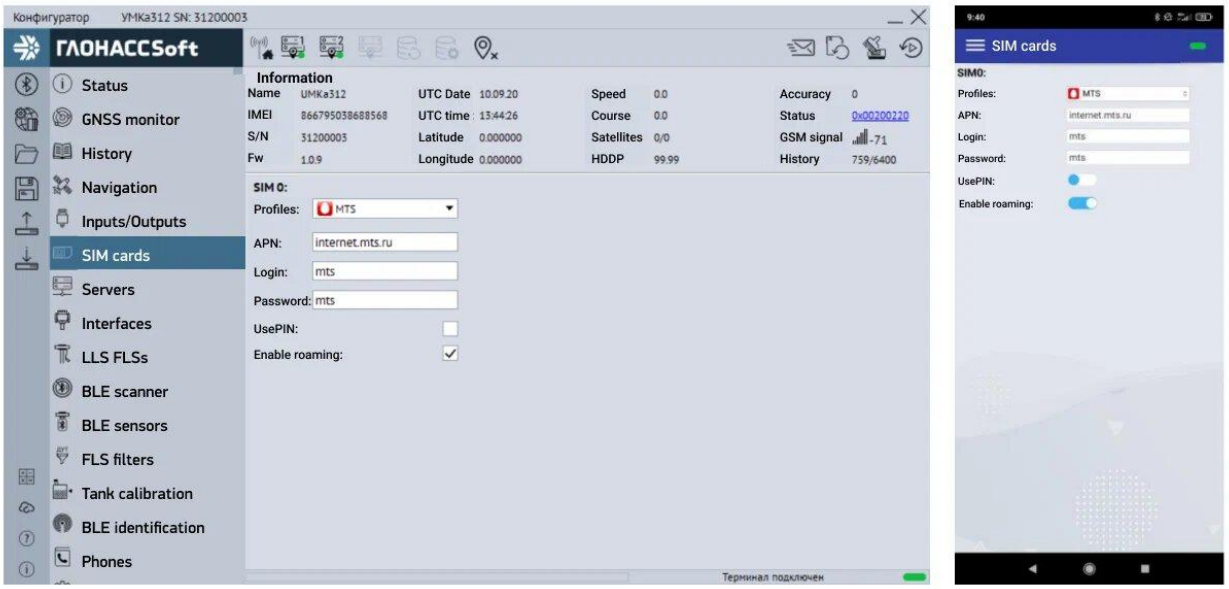


Figure 3.21 “SIM cards” tab

3.11 “Servers” tab

Server connection is configured in the “Servers” tab (Figure 3.22), where one should enter IP address (or domain) and port of the navigation server.

It is possible to specify an alternate and auxiliary address for the navigation server in the "Alternate server" and “Auxiliary server” fields.

Attention! You should not set two similar servers, as this leads to the device malfunction and increases traffic! Also, adhere to the following server selecting order: Primary server → Alternate server → Auxiliary server, if the servers are set out of order, for example, primary and auxiliary servers are set, and the alternate one is skipped, then the settings of the auxiliary one will be ignored.

The "Advanced Options" group controls the recording and transmitting of the data from internal and external sensors to the server. If there is no need to send some of the parameters, then uncheck the corresponding options. In doing so, one reduces the traffic and increases the capacity of the “black box”.

The "Protocol" option allows selecting of the data transfer protocol.

The "Uploading order" option determines in which order the data will be uploaded to the server when successfully connected. There are two available options: "From old to new" (sequential transmission of packages) or "Current first" (priority transmission of the current positioning data).

The "Online mode" option group configures the grouping of several spots into one packet, the time interval between packet transmissions, and it also allows to set the maximum size of the transmitted packet.

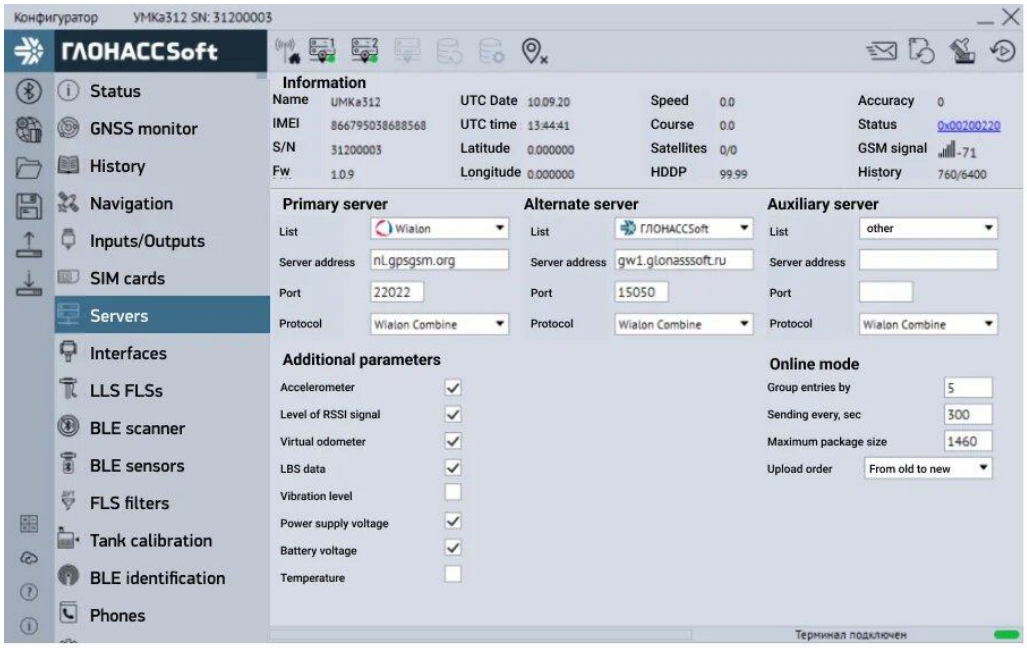


Figure 3.22 “Servers” tab

3.12 “Interfaces” tab

Not available in UMKa311!

In order to connect RS-485 devices to the tracker, use the “Interfaces” tab (Figure 3.23).

In this tab, you can turn the “FLS via LLS” mode on or off and set the interface speed. To do so, select the mode you need in the "Mode" dropdown menu, and specify the interface operating speed in the "Speed" dropdown menu.

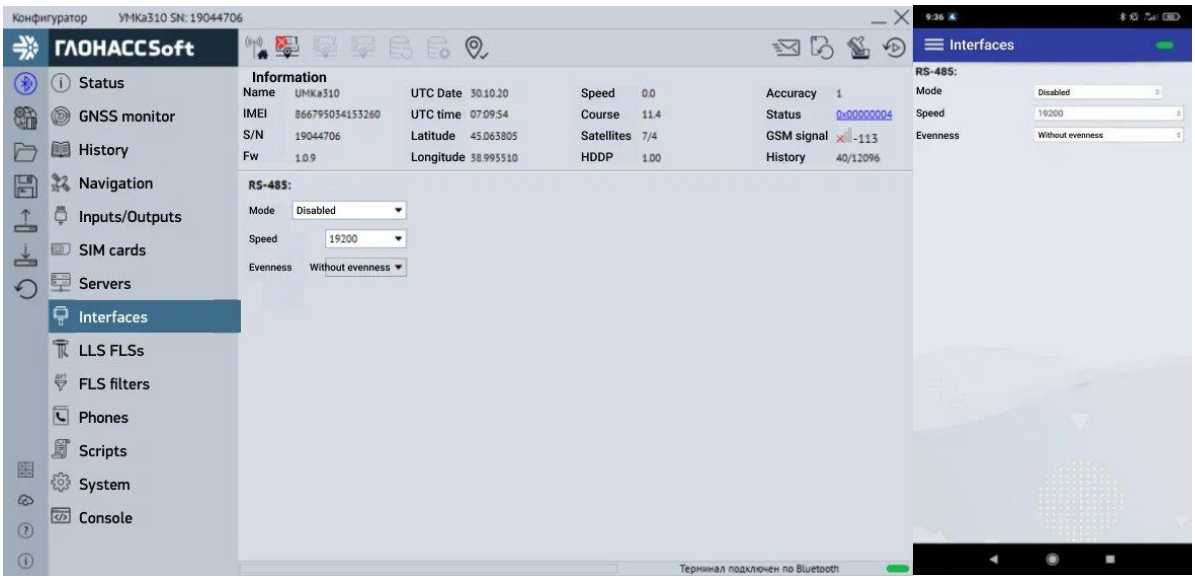


Figure 3.23 “Interfaces” tab

3.13 “FLSs” tab

Not available in UMKa311!

In order to configure and obtain the data from the fuel level sensors with RS-485 interface, use “FLSs” tab (Figure3.24), assigning addresses to each of the sensors in the appropriate field in advance. To assign the addresses in the tracker, it takes only to enter them in "RS-485 FLS addresses setting" field and write the configuration into the tracker. The configurator automatically displays the connected sensors and the parameters they provide.

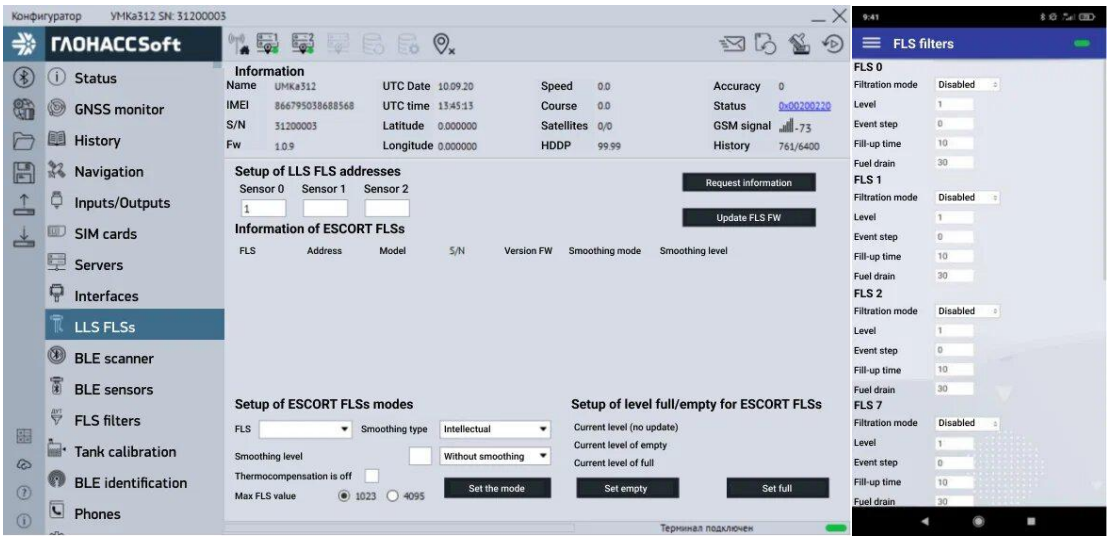


Figure 3.24 “FLSs” tab

Attention! Beforehand, switch one of the available interfaces into the "FLS via LLS" mode in the “Interfaces” tab, set the "Speed" option to "19200" and write the configuration into the tracker.

In order to configure smoothing of the FLS parameters, use “ESCORT”. To obtain a current smoothing parameter, select a FLS and click the “Request” button. To set a smoothing parameter, select a FLS, enter the smoothing parameter and click the “Setup” button.

3.14 “BLE scanner” tab

To detect the BLE devices that are actually seen by the tracker “BLE scanner” tab is used. In the scanner the BLE devices, their number, MAC addresses, signal level and names are represented.

To start work with BLE FLSs go to configurator in “System” tab and in parameters group ”Bluetooth parameters” choose ”BLE FLSs” (BLEMODE 2) or ”Configuration and BLE FLSs” (BLEMODE 3) in the dropdown menu. Then record configuration into the tracker.

By pressing the right button on necessary BLE FLS one can choose its number from dropdown menu.

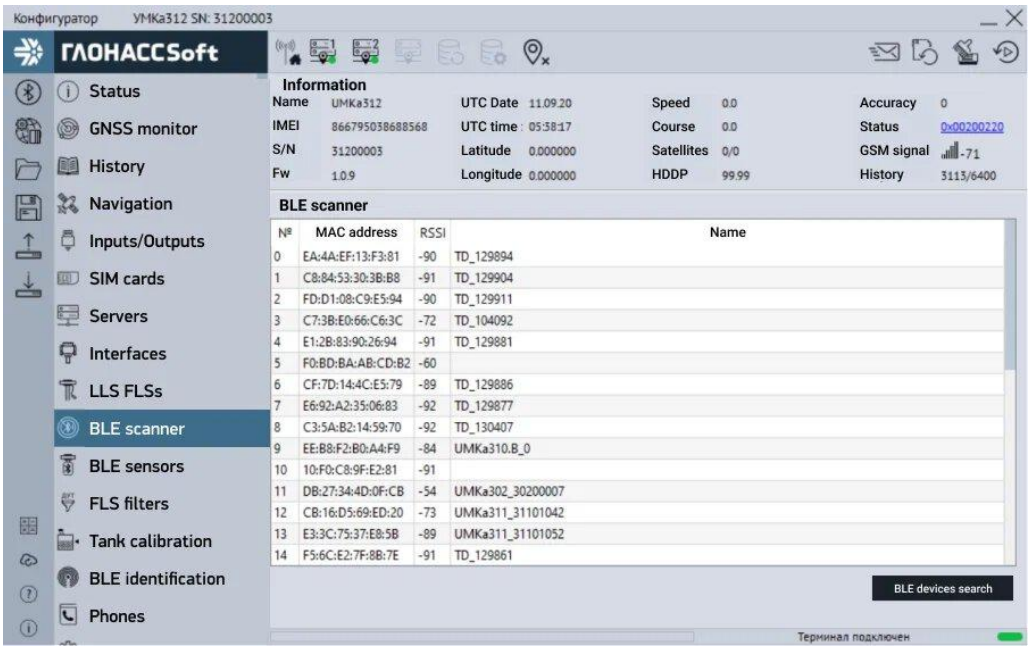


Figure 3.25 ”BLE scanner” tab

3.15 “BLE sensors” tab

The tab is not available in versions UMKa310, UMKa310R.

For settng up and receiving information from the trackers working via BLE use “BLE sensors” tab (Figure 3.26), from dropdown menu choose device type and enter MAC-address into corresponding field.

Then download configuration into the tracker

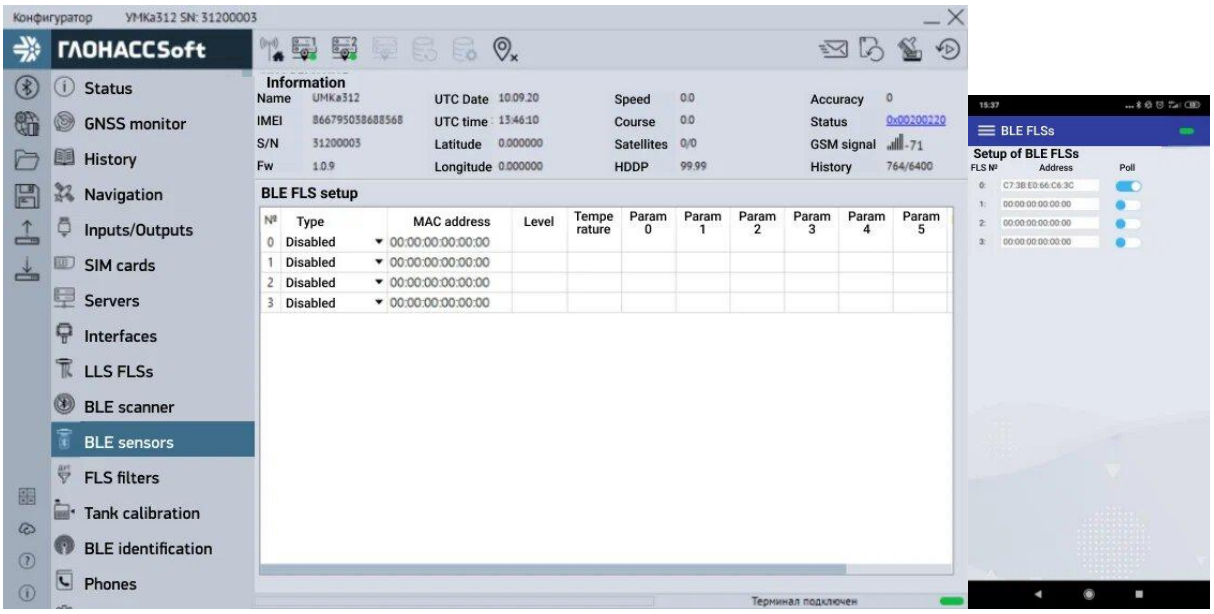


Figure 3.26 “BLE sensors” tab

3.16 “FLS filters” tab

To configure fuel level filtration and also control drain/fill up “FLS filters” tab is used.

On the tab the setting of 7 FLSs is available. From 0 to 2 - wired FLSs. From 7 to 10 - wireless FLSs. 15 - analog FLSs.

For each sensor there is a possibilty to set up “Filtration mode”, “Level”, “Steps of changes”, “Fill-up time”, “Draining time”.

Filtration mode can be configured as “simple filter” (of LFF (low frequency filter) low frequencies) as well as composite filter (median + LFF). A simple filter very well filters the noise around medium value. Composite median very well filters rapid short-time emissions. One should pick the type of filter in the view of object peculiarities. It is recommended to start with LFF.

The level of filtration can be specified within the range from 1 to 20. This is the time in minutes during which the output signal of the filter changes on 95% from the input signal change.

The step of event sets formation of additional spots when fuel level change on the specified number of level units occurs. If it is 0 - additional spots are not formed.

The fill-up time sets the period of time after which the fiter switches off by continuous increse of fuel level. 10 seconds are set by default. The drain time sets the period of time after which the filter switches off by continuous reduce of fuel level. 30 seconds are set by default.

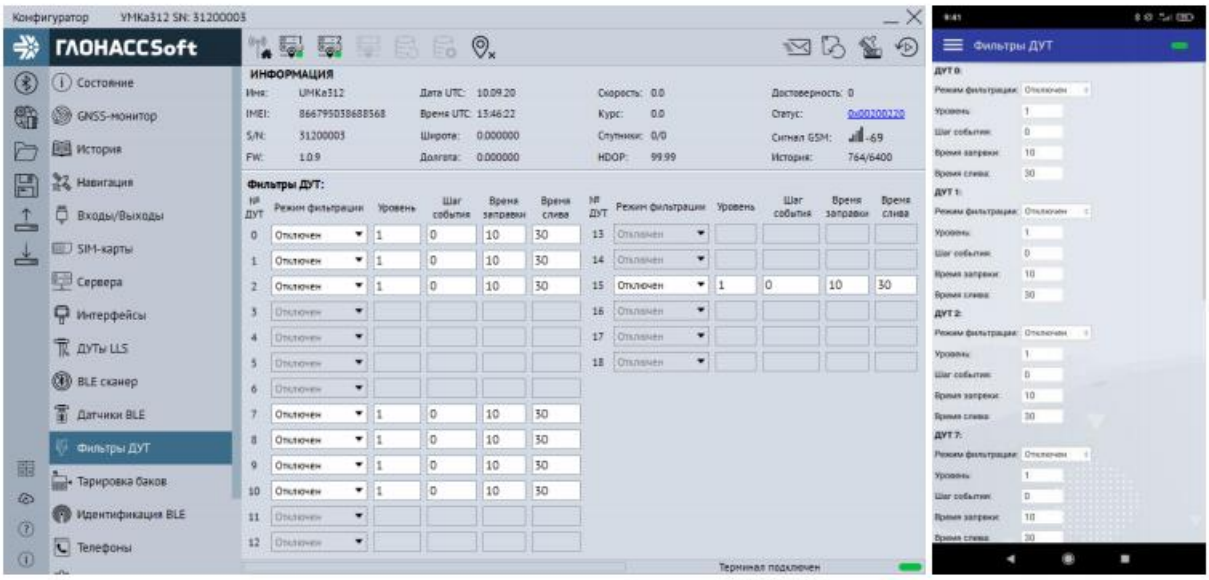


Figure 3.27 “FLS filters” tab

3.17 “BLE identification” tab

In “BLE identification” tab one can configure the tracker on receiver or beacon mode.

In receiver mode the terminal tracks the events of the specified beacon group. In “Mode” column one can choose the coincidence checkup on required identificators. For tracking all identifiers within the radius choose “Any “.

In radius column the radius of direct visibility is set where the identifiers are tracked.

In “UUID” column the unique identification number is entered.

In “Major” column the number of identifiers group with the same UUID is entered.

In “Minor” column the number of identifiers group with the same UUID and Major is entered.

By ticking “Transmit 0” the tracker will send value 0 to the server if there is no events withing the tracking radius according to specified filter.

By ticking “Event” the tracker will send the changes within the tracking radius according to specified filter on the server.

For enabling beacon mode tick the corresponding field of configurator.

UUID is a 128 byte unique identificator of beacon group that set their type and belonging to one organization. To receive a unique UUID press the button “generate UUID” .

“Major” helps configure the 16 byte unsigned value that allows to group beacons with similar UUID together. The value is within the range from 0 to 65535.

RSSI is a reference signal level on the distance of 1 metre. It is needed for more accurate detection of distance to the receiver.

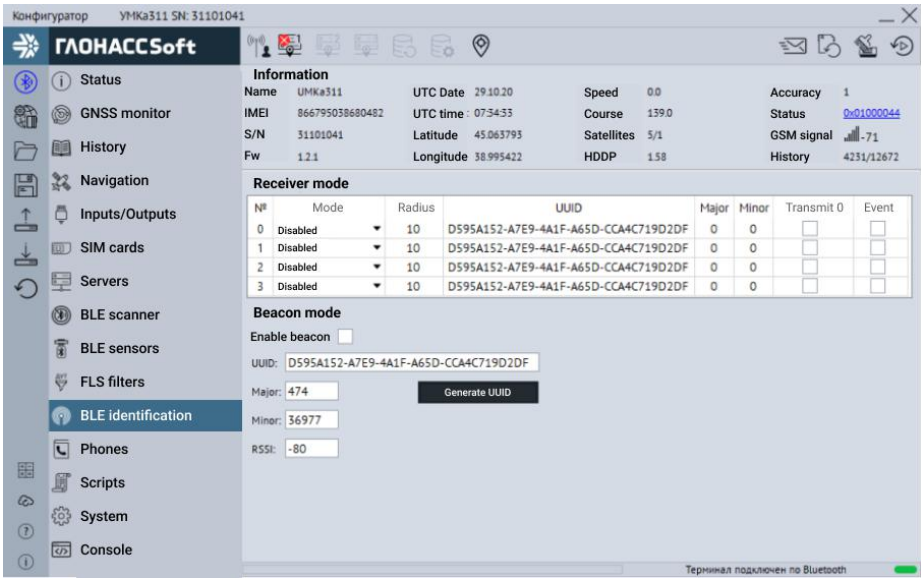


Figure 3.28 “BLE identification” tab

3.18 “Phone numbers” tab

To add, edit and delete phone numbers with the access to the tracker configuration, use the “Phone numbers” tab (Figure 3.29). Please note that the quantity of phone numbers is limited to five.

To add a phone number, press + “Add”, enter the phone number in the dialogue-box field and press “OK” (3.30).

To edit a phone number, select the number from the list and press ”Edit”, enter the phone number in the dialogue-box field and press “OK” (Figure 3.30).

To delete a phone number, select the number from the list and press “Delete”, press “Yes” in the dialogue-box (3.31).

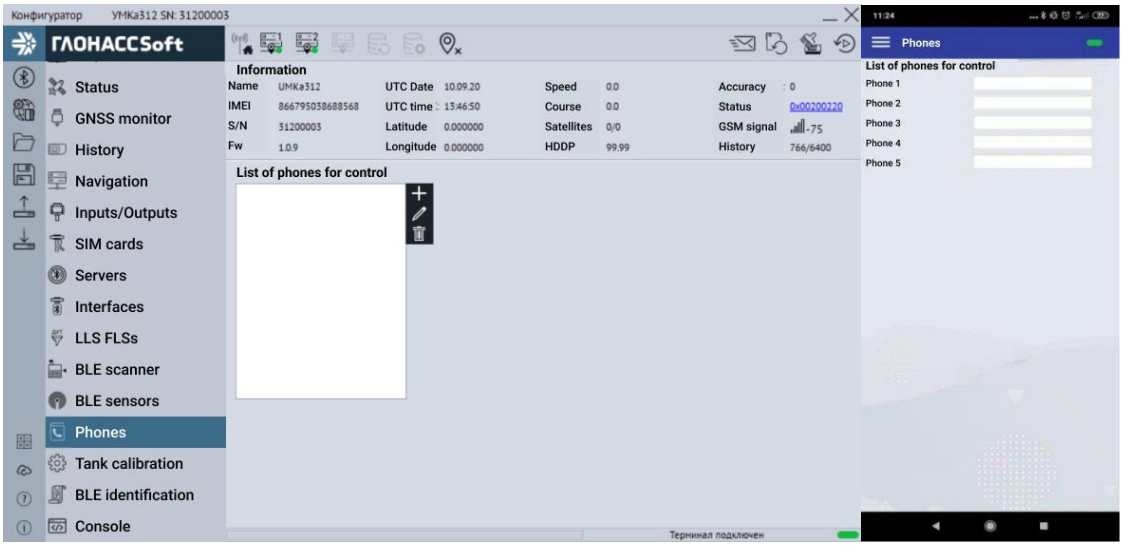


Figure 3.29 “Phones“ tab

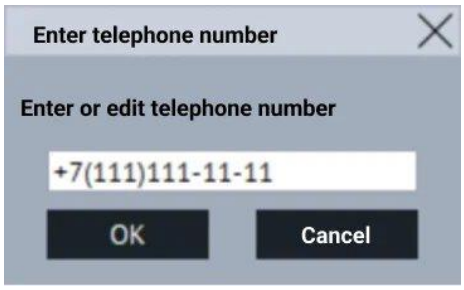


Figure 3.30 Phone number enter/edit dialogue-box

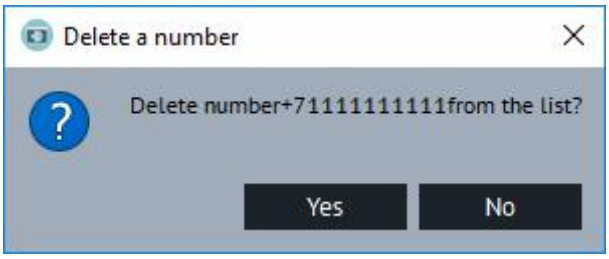


Figure 3.31 Phone number delete confirmation dialogue-box

3.19 “Scripts“ tab

To work with the scripts use “Scripts“ tab (Figure 3.32). Press the button “Choose“ . In appeared window (scripts choice) press + and mark the way to the file of the script. Pick the needed script and press “Choose“. To start the script work press “Launch” button. In “value” field the needed parameters will appear. Tick opposite the needed parameters for transmission onto the server.

To transmit parameters onto the server tick the parameter “Permit parameters transmission”.

With a tick on “Autostart” the script will function immediately after starting the tracker.

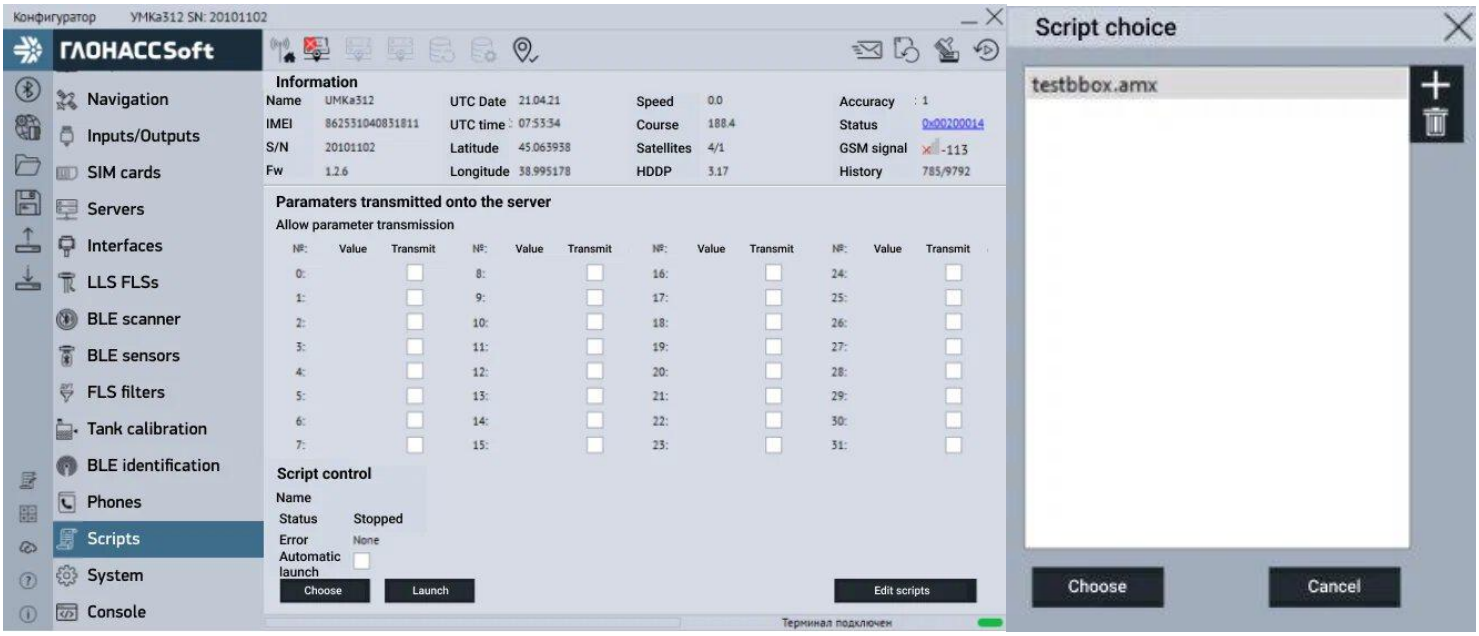


Figure 3.32 “Scripts” tab

3.20 “System” tab

For configuring tracker access, use the “System” tab (Figure 3.33), where one can assign the tracker name and access password. The same password is used for remote configuration and tracker configuration via SMS commands. In order to change the password, one must click the "Change password" button. The name can be changed without confirmation.

To enable permanent remote configuration, check the "Permanent connection" option in the "Remote configuration" option group. When this option is checked, the tracker being online will be permanently connected to the configuration server while waiting for the configurator to connect.

To enable Bluetooth, use the “Configuring via Bluetooth” option in the “Bluetooth parameters” option group. When this option is enabled, Bluetooth interface will stay permanently on for configuration via Bluetooth.

It is also possible to configure the power manager in the “System” tab (Figure 2.13) by using the “Configuring power saving modes” option group. Here you can set the timeout (within the range of 1 to 592200 seconds for switching to STANDBY mode and within the range of 1 to 86400 for switching to IDLE mod) and the voltage threshold (within the range of 0 to 42000 mV for the both of modes) for switching to the STANDBY/IDLE modes.

Calculation is started after the tracker switches to static navigation mode. To configure the battery function use the group of options “Battery parameters”.

“Quick battery charge” option enables the quick-charge mode. The mode description can be found in “Power supply manager” section.

“Battery capacity, mA” function allows to set the capacity of specified battery for accurate work. The range of values is from 250 to 1100 mA.

“Operation time from the battery, sec” option allows to set limitation of operation time from internal battery in seconds if there is no main voltage supply. By specifiying “0” value the tracker will continue operating during maximum time. The maximum parameter value is 84600 sec.

“Time before switching to idle mode from the battery, sec” allows to set the time before switching to idle mode (IDLE) by the battery work. Also there is an opportunity to configure activity window in group of parameters “Activity window parameters”.

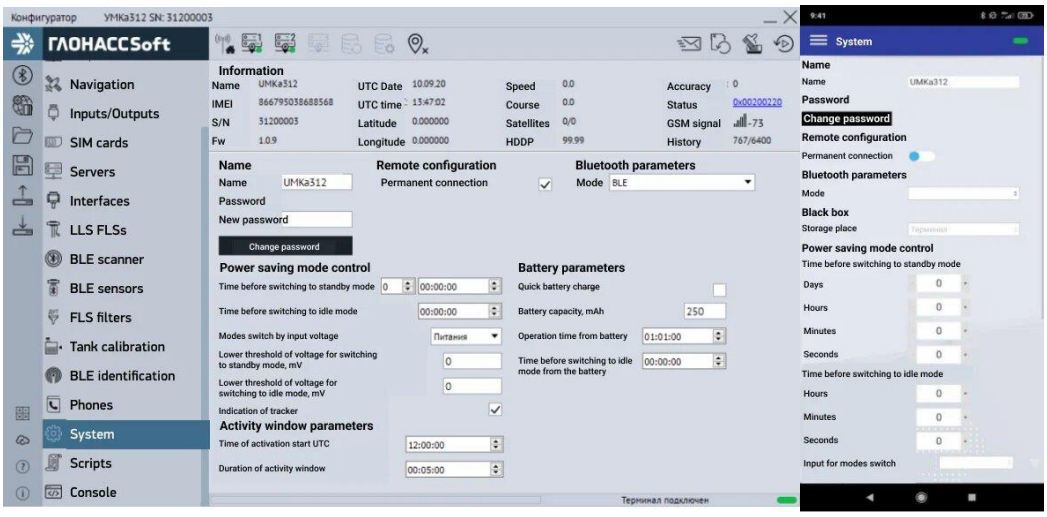


Figure 3.33 “System” tab

3.21 “Console” tab

Use the “Console” tab to enter the commands manually (Appendix A) and for the tracker troubleshooting (Figure 3.34).

Commands are entered in the field at the bottom of the window. When typing, the previously entered commands are displayed. To speed up entering process, one can select one of them. All previously entered commands are as well available in the dropdown list.

The command is sent by pressing the "Enter" key or the "Send" button.

The commands sent and their outputs are displayed in the main window. At that, the symbol ">" is displayed in the command row, and the symbol "<" - in the result row.

To clear the console, select the "Clear Log" option in the rightclick menu.

To save the contents of the console, select the "Save to file" option in the rightclick menu.

To test the operation of various modules or the tracker as a whole, one can press the "Debug mode" button. As a result, a window will pop up (Figure 3.35) containing the "Source" option, with the field for selecting a module, and the “Level” option, with the field for selecting a message level filter ("Level. Click the "Apply" button, and debug messages will be displayed in the main window.

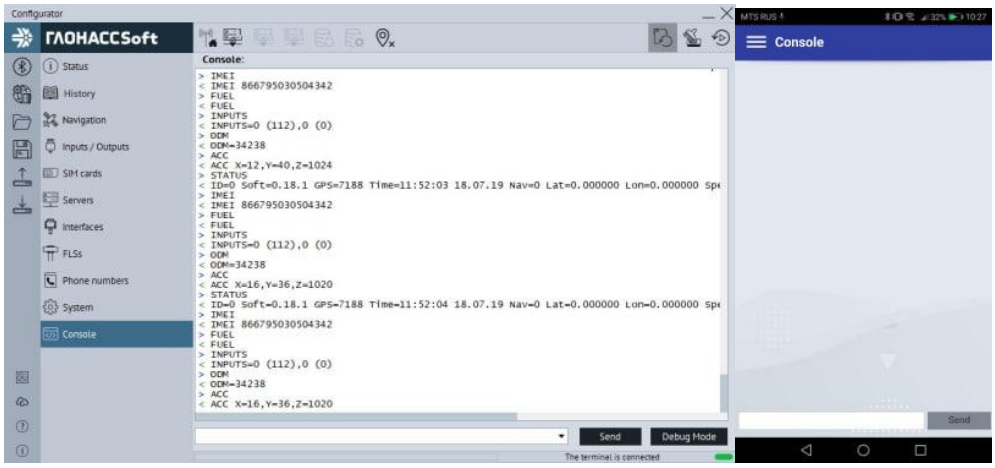


Figure 3.34 “Console” tab

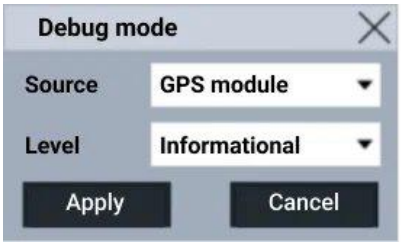


Figure 3.35 “Debug mode” tab

3.22 Configuring via SMS

It is possible to perform tracker configuration and troubleshooting via SMS. The tracker will respond to every command described in Appendix A sent from an authorized phone number. Before starting tracker configuration via SMS, one must authorize the phone number from which the command will be sent. To do so, send the AUTH command from it. For instance, the “AUTH 0” command, where “0” is a default password, authorizes the phone number, which sent the SMS. The “AUTH OK +7XXXXXXXXXX” message will be sent in respond to this command. In order to delete the second phone number from the list, use “AUTH 0,2,-“ command, where “-“ means “delete the phone number”.

Thus, some of the commands have mandatory and optional parameters to specify, this in turn simplifies the configuration. To get detailed information on the list of commands and their purpose see Appendix A.

4 MALFUNCTION

Information about typical malfunctions arising at tracker configuring and debugging and methods of their elimination can be found in Appendix B of this document. Beforehand, it is advised to read the sections "INSTALLATION", "OPERATING INSTRUCTIONS" very carefully, and the operator manual for the navigation system as well.

5 INDICATIONS OF USE

5.1 Safety instructions

Installation of the trackers should be carried out by specially trained technicians with the knowledge of the fundamentals of electrical engineering and safety.

Installation should be performed under normal illumination and in the absence of rain.

When connecting the tracker to an auxiliary equipment (FLS, flowmeters, etc.), one should comply with the operating manuals for this equipment.

5.2 Operational constraints

Operational constraints of the trackers are imposed by limiting values of the technical characteristics specified in the passport of the VBRM 022.000.000 PS product and in technical specifications TU 26.30.11-001-29608716-2018.

5.3 Technical maintenance

Technical maintenance (hereinafter referred to as TM) of the product must performed in compliance with the technical specifications TU 26.30.11-001-29608716-2018.

TM is carried out with the purpose of maintaining the operability or integrity of the product during its entire service life.

While in use, the product should go through the following types of TM:

– periodic maintenance;

– preventive maintenance;

– corrective maintenance.

Periodic maintenance to be performed at least once a year.

Preventive maintenance includes a technical survey of the product. Technical survey is performed once a 2 year interval or after the repair or modernization of the product.

Corrective maintenance is performed right after a malfunction has been detected.

When maintaining the product, it is necessary to follow safety instructions specified in 5.1 paragraph of this manual.

All tests should be carried out under normal conditions:

– air temperature (25 ± 10) ° C;

– relative air humidity of 45 to 80%;

– air pressure of 630 to 800 mm Hg.

It is allowed to perform maintenance under other conditions, if they fall within the permissible range. In this case, the values of parameters characterizing these conditions should not exceed the value limits of operating conditions for the instrumentation (measuring instruments).

When troubleshooting the product, follow the instructions in Section 3 and Appendix B of this MM.

The product repair is performed by the manufacturer.

5.4 Transportation and storage

When transporting and storing, comply with the technical specifications TU 26.30.11-001-29608716-2018. Transportation by water (river or sea) is carried out in a sealed package or in dry sealed compartments or containers. Transportation by air is carried out in the sealed compartments. After transporting the tracker at subzero temperatures, it is necessary to keep it at room temperature for 24 hours.

Besides, please keep in mind that mobile operators can impose some extra restrictions on the use of the SIM cards inactive for a long period of time.

5.5 Manufacturer warranty

Warranty life – 5 years from the manufacture date.

The manufacturer promises to repair the UMKa310 tracker free of charge within the warranty period (or replace it with the device of a similar modification).

This warranty is legally valid when the device is submitted together with the rightly and legibly completed complaint form (you can find the form at https://glonasssoft.ru). Customers deliver the device to the place of repair by their own means.

The manufacturer shall not be liable for damages to property, or persons, or any other damages suffered by the UMKa310 owner or the third party due the failure to comply with the rules of transportation, storage, installation and operation specified in the Operating Manual.

The tracker service life is 5 years.

<u>The warranty does not cover:</u>

- defects caused by the failure to comply with the rules of transportation, storage, installation and operation specified in the Operating Manual;
- connecting wires, slots, pins and SIM card holders;
- trackers without casing or with mechanical damages and defects (cracks and nicks, dents, traces of blows, etc.) caused by the customers due to violating operating,storage and transportation conditions;
- trackers with traces of corrosion or other signs of fluid exposure;
- trackers with the signs of an unauthorized repair or upgrade;
- trackers with electrical and/or other damages due to the invalid condition of the external electrical circuit or improper use of the tracker;
- trackers that failed due to unauthorized software updates.

5.6 Claim information

The manufacturer will not accept claims if the device malfunction has been caused by a customer due to improper operation and failure to comply with the instructions of this manual, or violation of transportation conditions by freight companies.

Manufacturer contacts:
OOO Internet Veshchey
Ul. Zipovskaya, d. 5, korp. 1, liter 2B
Krasnodar, Krasnodar Krai
Russia
350010
Manufacturer Website: http://glonasssoft.ru
Technical support: http://help.glonasssoft.ru
Phone number: 8(800)700 82 21

6 FREQUENTLY ASKED QUESTIONS

6.1 GPRS traffic costs optimization

One can reduce the costs of GPRS traffic in the online monitoring mode by following these tips:

1. In order to reduce traffic, use Wialon Combine protocol. To change the protocol, in “Servers” tab menu select “Protocol” option, then select “Wialon Combine” in dropdown menu.
2. Disable transmission of the unused parameters. To do so, open the configurator tab “Servers”, and then uncheck unused parameters in “Advanced options” group.
3. Increase the number of records in data packets. To do so, open the configurator tab “Servers”, select “Online mode” option, and then increase the “Group records by” parameter.
4. Increase the spot recording period. To do so: open the configurator tab “Navigation”, select “Setting the recording period” option and increase the parameter.
5. Increase the value of the angle and distance, exceeding of which leads to spot recording. To do so, open the configurator tab “Navigation”, increase the values in “Angle in degrees” and “Distance, m” options. One can also change the parameter by sending SMS command “TRACK” (command description ref. app. A). Route tracing quality will get lower, but the traffic will be reduced as well.

6.2 How to reupload data from black box?

From version 0.18.12 the command “Bbox Upload=X” is used for data reupload. The process is given below.

By entering the command to the queue for transmition all spots black box are added in black box, wherein the new and earlier not transmitted spots have a priority according to the chosen strategy of data upload, and are transmitted in due manner. The reuploaded spots are added into the packages on leftover principle. Yet if there is no current spots for transmission, the package consisting of reuploaded spots only is formed.

The command is enabled till complete reupload of all added spots or till the tracker reboot. The command itself and black box reupload do not enter any changes into black box file.

6.3 Why is the tracker constantly rebooting?

The main reason for constant tracker reboot is the wrong choice of spot for connecting the tracker to the car wiring. By working in GSM network the tracker consumption is impulsive, i.e. relative long periods of inconsiderable consumption are changed by impulses of high consumption level at the moment of data transmission. The duration of high-consumption impulses as a rule equals to milliseconds. If the tracker is connected with thin long wires or with chains that have significant counteraction, at the moment of transmission the supply voltage of the tracker drops lower than the minimum value. It leads to overload. As voltage slump has short duration it is impossible to see it with a cost-effective multimeter. The multimeter will show the average value within the norm.

Also one can face intermediate state when the tracker reboots only in certain zones with weak signal level. This problem has the same roots. By the low signal level of cellular network a modem of the tracker starts increasing transmission power. At the same time power supply drops below critical level and the tracker reboots.

It is recommended to carefully pick the tracker connection spot and bear in mind that not all connection spots are capable of ensuring the needed power. Also the length of wires (the longer-the worse), thickness of copper core (the thinner-the worse), wire quality (the more wire twists-the worse) influence the power delivered to the tracker.

If the situation with permanent or intermittent tracker reboots occurs, it is recommended to change the spot of tracker connection to the car wiring.

APPENDIX A. Table of supported SMS commands

№	Command	Reply	Arguments	Description	Versions
1	AUTH X,Y,Z Example: AUTH 1234 AUTH 0,2 AUTH 0,1,+79001234567 AUTH 0,1,-	AUTH OK,Z Example: AUTH=OK,+79001234567, AUTH=FAIL	X – password (by default 0). Y=0..4 – memory location for storing a phone number (optional argument), Z=phone number in format “+7xxxxxxxxxx” to be written in the memory location (optional argument, used when sending the command via GPRS and USB). Z=- -delete a telephone number in the specified memory location	Authorize the phone number which sent the SMS or the explicit phone number Z, and write it into the first free location or into Y location. Authorization is only required for the tracker configuration via SMS. Numbers are always entered and displayed in an international format. Example: +79001234567	0.12.8 or higher
2	PHONES [X[,PH0…[,PH4]]] Example: PHONES 0,+798765432101	PHONES=PH0,PH1,PH2,PH3,PH4 Пример: PHONES=+798765432101,,,,	X – password PH0… PH4 - authorized numbers	Display the list of authorized phone numbers. Password is required for SMSs from unauthorized phone numbers.	0.12.8 or higher
3	STATUS	Example: STATUS ID=20101102,Soft=1.0.9, GPS=6/9472,Time=10:22:30,15.09.20,Nav=1,Lat=45.063702,Lon=38.995556,Speed=0.0,Course=187.6,SatCnt=5+1,HDOP=1.60,RSSI=113,Stat=0x00200014	Command without arguments	Requesting the current tracker status. ID – serial number, Soft – software version, GPS – current phone number of data package, Time – current date and time GMT, Nav – coordinates validity, Lat – latitude, Lon – longitude, Speed – velocity, Course - direction, SatCnt – number of sattelites (GPS+GLONASS), RSSI - level of network signal, Stat – status.	0.27.0 or higher

4	PASS X,Y Example: PASS 0,1234	PASS=OK PASS=FAIL example: PASS=OK	X – an old password, by default X=0. Y – a new password.	Password setting.	0.12.8 or higher
5	IMEI Example: IMEI	IMEI Example: IMEI 866104027972994	Command without arguments	Display IMEI of the GSM module, installed in the tracker. (Available at any time. The copy is saved in a configuration).	0.12.8 or higher
6	SETGPRS0 X,Y,Z Example: SETGPRS0 internet.beeline.ru,beeline,beeline	SETGPRS0:APN=X,user=Y, pass=Z Пример: SETGPRS0: APN=internet.beeline.ru, user=beeline,pass=beeline	X – access point, by default X=internet.beeline.ru Y – login, by default Y=beeline Z – password, by default Z=beeline	Setting GPRS parameters for the SIM card. Command without arguments returns the current GPRS setting.	0.12.8 or higher
7	SETSERV D1:P1,D2:P2,D3:P3	SERVER= D1:P1,D2:P2,D3:P	D1 – IP address or domain of the first (primary) server; P1 – the first (primary) server port; D2 – IP address or domain of the second (alternate) server; P2 – the second (alternate) server port; D3 – IP address or domain of the third (auxiliary) server; P3 – the third (auxiliary) server port.	Setting IP address or domain name for the primary and alternate servers, to which the tracker gets connected to transfer data. Addresses and ports are separated by the colon. If the alternate server is not specified, it is off. Command without arguments returns the current addresses/domain names, and ports either for both servers or for the primary server only.	0.12.8 or higher
8	PERIOD X,Y	PERIOD = X,Y Example: PERIOD = 30,300	X – the recording period at driving, sec Y – the recording period at stops, sec	Setting the recording periods (in seconds) for data packages at driving and at stops.	0.12.8 or higher

9	TRACK X,Y,Z,A,B	TRACK=X,Y,Z,A Example: TRACK=3,10,300 ,10,10	X – minimum velocity Y – angle in degrees Z – distance in meters A – acceleration, km/h B – minimum distance between spots, m. By default, X = 3, Y = 10, Z = 300, A = 10, B =2	The command sets tracing quality. New spot is recorded when vehicle-course angle exceeds Y, or the distance to the previous spot is larger than Z, or acceleration is bigger than A.	0.12.8 or higher
10	RELOAD	Reloading…	Command without arguments	The tracker is reloaded.	0.12.8
					or higher
11	RESET	Reloading…	Command without arguments	The tracker is reset.	0.12.8 or higher
12	WHO	DEV: UMKa310 FW: 0.12.8 SN: 18180001 OPT: None IMEI: 866104027988164	Command without arguments	Returns information about the tracker.	0.12.8 or higher
13	NAME X Example: NAME SuperCar NAME -	NAME="X" Пример: NAME="SuperCar" NAME=""	X – the tracker name, '-' character resets the name to blank	Setting the tracker name. The name may contain only digits and Latin characters. The name is no more than 10 characters. It is added to SMSs.	0.12.8 or higher
14	PIN0 X Example: PIN0 1234 PIN0	PIN0=OK PIN0=FAIL PIN0=SET PIN0=CLEAR example: PIN0=OK	X = PIN X='-' – PIN disabled	Setting a PIN for the SIM card. Command without arguments displays status: PIN0 SET – PIN is set, PIN0 CLEAR – PIN is cleared.	0.12.8 or higher
15	LLS485 X0,X1,X2 Example: LLS485 0,1,2	LLS485=X0,X1,X2 Example: LLS485=0,1,2	X0,X1,X2 - addresses of the LLS sensors connected to the tracker via RS485 X='-' – query disabled	Setting LLS sensors addresses.	0.12.8 or higher

16	FUEL	Example: FUEL F0=187, T0=19; F1=321, T1=21; F2=0, T2=0	Command without arguments	Display the current fuel level and temperature readings from fuel level sensors connected via RS-485. If a sensor query fails, the "?" character is rendered in the corresponding fields F and T.	0.12.8 or higher
17	SN	SN X Example: SN 17003456	Command without arguments	Returns tracker serial number.	0.12.8 or higher
18	UPDATE	Updating...	Command without arguments	Connecting to an update server, checking for the current firmware version, updating to the current version.	0.12.8 or higher
19	INPUTS	INPUTS=A,X Example: INPUTS=0 (0),1 (1)	A – IN0 input value (AIN0) X – IN1 value (DIN0)	Burst reading of the input values. The range of measured input values is specified by its setting. Analog inputs are returned in mV. In brackets, there is an unprocessed input status. For AINn – voltage in mV, for DINn – current logical level.	0.12.8 or higher
20	SETINPUTS A,X Example: SETINPUTS 0,1	SETINPUTS=A,X Example: SETINPUTS=0,1	A – IN0 input mode (AIN0) X – IN1 input mode (DIN0) For A: 0 – off; 1 – discrete input (+); 2 – high priority discrete input (+); 3 – analog input. For X: 0 – off; 1 – discrete input (+); 2– high priority discrete input (+); 4 – output mode (DIN0) (UMKa310 and UMKa310.B);	Burst setting of inputs. Command without arguments returns the current settings.	0.12.8 or higher

			5 - “Analog FLS” (AIN0)		
21	SETINPUT0 X	SETINPUT0=X Example: SETINPUT0=0	X – IN0 input mode (AIN0) Modes: 0 – off; 1 – discrete input (+); 2 – high priority discrete input (+); 3 – analog input; 4 - output mode (DIN0) (UMKa310 and UMKa310.B); 5 - “Analog FLS” (AIN0)	Setting the IN0 input mode. Command without arguments returns the current settings.	0.12.8 or higher
22	SETINPUT1 X	SETINPUT1=X	X – IN1 input mode (DIN0) Modes:	Setting the IN1 input mode. Command without arguments returns the current	0.12.8 or
			0 – off; 1 – discrete input (+); 2 – high priority discrete input (+); 4 – output modeDIN0) (UMKa310 and UMKa310.B); 5 - “Analog FLS” (AIN0)	settings.	higher
23	SETLIM0 X,Y Example: SETLIM0 6000,8000 SETLIM0 6000	SETLIM 0= X,Y Example: SETLIM0=6000,8000 SETLIM0=6000,6000	X – lower switching threshold for IN0 (AIN0). Y – upper switching threshold for IN0 (AIN0). Default values: X = 5000, Y = 6000.	Setting the switching thresholds for IN0 input. Thresholds are specified in mV. Only one threshold is allowed. Command without arguments returns the current settings.	0.12.8 or higher
24	INSTATIC X,Y Example: INSTATIC 0,0 INSTATIC -1	INSTATIC=X,Y Example: INSTATIC=0,0 INSTATIC=-1,0	X – number of the input for static navigation mode. To disable: X = -1 or X = 255 Y – logical level of the input in static navigation mode, 0 or 1. Default values: X = -1, Y = 0	Selecting the input for static navigation mode. The input selected should be set with the SETINPUTx command into 0 or 1 mode. Command without arguments returns the current settings.	0.12.8 or higher

25	OUTPUT0 X Example: OUTPUT0 0 OUTPUT0 1	OUTPUT0=X Example: OUTPUT0=0 OUTPUT0=1	X – IN1 output value (DIN0) X=0 – output open X=1 – output shorted to GND	Controlling the IN1 discrete output (DIN0). Command without argument returns the current settings.	0.12.8 or higher
26	STATMASK X,Y	STATMASK=X,Y Example: STATMASK=0x00020200, 0x00000000	X – event status mask in decimal or hexadecimal format Y –priority mask for event status changes in hexadecimal format	Status field mask. When any of set bits changed, non-queue black-box record is made. Default values for UMKa310: STATMASK=0x00020200,0x00000000	0.12.8 or higher
27	SPEEDALARM X Example: SPEEDALARM 90 SPEEDALARM -1	SPEEDALARM X Example: SPEEDALARM=90 SPEEDALARM=-1	X – the vehicle velocity, km/h. Within the range of 0 to 1192. To disable: X = -1. Default values: X = -1.	Controlling the IN1 discrete output (DIN0) of the terminal as a function of the vehicle speed. Output gets shorted when the vehicle velocity exceeds X and opens when the velocity less than or equal to X.	0.12.8 or higher
28	PSTATIC X Example: PSTATIC 1	PSTATIC=X Example: PSTATIC=1	X – mode of the static navigation by accelerometer X=0 – disabled X=1 – enabled	Controlling the static navigation by accelerometer.	0.12.8 or higher
29	MAXACC X,Y,Z Example: MAXACC 50,300,1	MAXACC=X,Y Example: MAXACC=50,300,1	X – accelerometer threshold in nominal units Y – static navigation mode timeout in seconds Z – number of threshold exceedings to exit the static navigation mode By default: X = 50, Y = 300, Z = 1	Setting accelerometer threshold and static navigation mode timeout.	0.12.8 or higher

30	SETPROTOCOL P1,P2,P3 Example: SETPROTOCOL 0,1,0	SETPROTOCOL= P1,P2,P3 Example: SETPROTOCOL=0,1,0	P1 – the first (primary) server protocol P2 – the second (alternate) server protocol P3 – the third (auxiliary) server protocol For P1, P2, P3: 0 – Wialon IPS v1.1 protocol 1 – Wialon IPS v2.0 protocol 2 – Wialon Combine v1.04 protocol 3 – ADM ptorocol (ADM600) ; 4 – Avelon protocol 2.0; 5 – ASC protocol; 6 – Avelon 1.0 protocol; 7 – EGTS protocol; 8 – ScoutOpen protocol; By default P1=2, P2=2, P3=2	Selecting the protocol for communication between the server and the terminal. Command without arguments returns the current settings.	0.12.8 or higher
31	ROAMING0 X Example: ROAMING0 1	ROAMING0=X Example: ROAMING0=1	X – SIM0 roaming X=0 – disabled X=1 – enabled Default value: X = 0	The command enables or disables SIM0 roaming operation. Command without arguments returns the current settings.	0.12.8 or higher
32	SERIAL X Example: SERIAL 1	SERIAL=X Example: SERIAL=1	X – data uploading order X=0 – from old to new X=1 – current first Default value: X = 0	Setting the order of data transmission to the server. Command without arguments returns the current settings.	0.12.8 or higher
33	ACC	ACC X=X, Y=Y, Z=Z Example: ACC X=27, Y=15, Z=1031	X – acceleration along the tracker X axis Y – acceleration along the tracker Y axis Z – acceleration along the tracker Z axis	Current acceleration along the tracker in milli-gravities.	0.12.8 or higher
34	SETACC X Example: SETACC 1	SETACC=X Example: SETACC=1	X – tracker acceleration transmission X=0 – disabled X=1 – enabled	Configuring the transmission of the current acceleration data. Command without arguments returns the current settings.	0.12.8 or higher
			Default value: X = 0		

35	RS485 X,Y Example: RS485 1,9600	RS485 X,Y Example: RS485 1,9600	X – interface operating mode: X=0 – interface disabled X=1 – FLS polling via LLS protocol X=7 - script Y – interface operating speed The following values are available for Y: 1200, 2400, 4800, 9600, 19200, 38400, 57600, and 115200 bit/sec. Z – sign transmission format (bits, evenness,) Z=0 – 8 bits, without evenness, 1 стоп (8-N-1) Z=1 – 8 bits, evenness, 1 стоп (8-E-1) Z=2 – 8 bits,oddness, 1 стоп (8-O-1) Without arguments returns current settings.	RS-485 interface configuration. Specifying data transfer speed and the operating mode.	0.12.8 or higher
36	GNSSRESTART X Example: GNSSRESTART 1	GNSSRESTART=1	X – starting mode of the GNSS module after restart: X=0 – hot start X=1 – warm start X=2 – cold start X=3 – end-to-end cold start	Restarting GNSS module. Write only.	0.12.8 or higher
37	GNSSMODE X Example: GNSSMODE 1	GNSSMODE=1	X – satellites grouping: X=0 – GPS and GLONASS; X=1 – GLONASS only; X=2 – GPS only.	Selecting satellites grouping for GNSS. Write only.	0.12.8 or higher

38	GNSSMONITOR X,Y,Z Example: GNSSMONITOR 1,5,120	GNSSMONITOR=1,5,12 0	X – monitoring the minimum number of visible satellites: X=0 – disable monitoring; X=1 – enable monitoring. Y – the minimum number of visible satellite to initiate GNSS reload timeout, within the range of 1 to 12. Z - GNSS reload timeout in seconds, within the range of 60 to 3600.	Automatic end-to-end cold start of the GNSS module when number of visible satellites is below minimum for the set period of time.	0.12.8 or higher
39	TRAFFIC X,Y,Z Example: TRAFFIC 1,0,1460	TRAFFIC=1,0,1460	X – grouping by number. If X = 1 – grouping disabled; Y – grouping by time, in seconds. If Y = 0 – time grouping disabled. Z – maximum packet size, within the range of 536 to 1460.	Grouping the spots in packets by number and time to reduce traffic.	0.12.8 or higher
40	ICCID	ICCID="8999999999999 99999"	Command without arguments	Returns ICCID of the active SIM card.	0.12.8 or higher
41	MAXHDOP X Example: MAXHDOP 5.5	MAXHDOP=5.5	X – maximum HDOP X value is within the range of 0 to 12	Setting maximum HDOP. All the coordinates with the HDOP above maximum will be transmitted as the invalid ones. By default: X=5.0	0.12.8 or higher
42	SATHDOP X,Y Example: SATHDOP 3,5.5	SATHDOP=3,5.50	X – minimum number of satellites, within the range of 1 to 10 Y – maximum HDOP, within the range of 0 to 25	Setting the maximum HDOP for the minimum number of satellites. All the coordinates with the HDOP above Y and the satellites number below X, will be transmitted as the invalid ones. By default: X=6,Y=2.0.	0.12.8 or higher

43	NAVMODULE	NAVMODULE="B03V02SIM868_96"	Command without arguments	Returns the GNSS module firmware version. If the version is not determined, returns “NONE”.	0.12.8 or higher
44	SETODM X Example: SETODM 1	SETODM=1	X – virtual odometer operating mode: X=0 – odometer disabled; X=1 – odometer enabled.	Configuring the transmission of the value from the virtual odometer to the server.	0.12.8 or higher
45	ODM X Example: ODM 150	ODM=150	If X is specified – initial mileage setting. X – initial mileage, in meters.	Obtain or set the virtual odometer value. Returns mileage in meters or “?” in case of error.	0.12.8 or higher
46	SETRSSI X Example:	SETRSSI=1	X – signal level transmission mode: X=0 – transmission disabled;	Configuring the transmission of the RSSI signal level to the server.	0.12.8 or
	SETRSSI 1		X=1 – transmission enabled.		higher
47	UPDATE VER=X.Y.Z Example: UPDATE VER=0.13.2	Updating...	VER=X.Y.Z update to the current version. X.Y.Z – three version digits separated by dots.	Updating to the specified firmware version, but not older than the current one.	0.12.8 or higher
48	SENDSMS X,Y Example: SENDSMS +71111111111,WHO	SENDSMS=OK,+711111 11111	X – phone number, to which the reply to the Y command will be sent. Y – command, the reply to which will be sent to the phone number X.	Responding to the Y command in the form of SMS to the X number.	0.12.8 or higher
49	GNSSTIME X Example: GNSSTIME 04.04.2018 15:12:41	GNSSTIME=04.04.2018 15:12:41	X – UTC time in the “DAY.MON.YEAR HOUR:MIN:SEC” format. For example, “29.12.2017 12:45:05”. UTC time = MSK – 3 h. Where MSK – current local time in Moscow.	Setting the tracker time, when the tracker for some reason does not see a single satellite.	0.12.8 or higher

50	REMCFG STATUS	REMCFG=OK,X,Y:Z Example: REMCFG=OK,Disable, medium.glonasssoft.ru: 12358	X – permanent connection to the remote configuration server: X = Disable – disconnected; X = Enable – connected; Y:Z – remote configuration server address and port. By default X = Disable, Y:Z = medium.glonasssoft.ru:12358	Requesting settings for remote configuration mode.	0.12.8 or higher
51	REMCFG ENABLE	REMCFG=OK	Command without arguments	Enable permanent connection to the remote configuration server.	0.12.8 or higher
52	REMCFG DISABLE	REMCFG=OK	Command without arguments	Disable permanent connection to the remote configuration server.	0.12.8 or higher
53	REMCFG DEFAULT	REMCFG=OK	Command without arguments	Restore the default settings.	0.12.8 or
					higher
54	REMCFG START	REMCFG=OK,1800,Y Example: REMCFG=OK,1800,86151 0030390799	1800 – session duration, in seconds Y – tracker IMEI	Initiate the remote configuration session with the duration of 30 minutes.	0.12.8 or higher
55	REMCFG START=A	REMCFG=OK,X,Y Example: REMCFG=OK,1800,86151 0030390799	A – session duration. It may be specified in seconds, minutes and hours. For example, if A = 600 or A = 600s – session duration is 600 seconds, if A = 30m – 30 minutes, if A = 2h – 2 hours. X – session duration, in seconds. Y – tracker IMEI.	Initiate the remote configuration session with the set duration.	0.12.8 or higher

56	REMCFG STOP	REMCFG=OK	Command without arguments	Terminate the remote configuration session.	0.12.8 or higher
57	REMCFG	REMCFG=OK,X,Y Example: REMCFG=OK,1800,861510030390799	X – session duration, in seconds Y – tracker IMEI	Command without arguments is equivalent to “REMCFG START”.	0.12.8 or higher
58	SU X,Y	Respond to the Y command	X – tracker password Y – executable command with arguments If successful, returns the reply for Y command.	Execute the command without prior authorization in the tracker (“Super User”).	0.12.8 or higher
59	UPTIME	UPTIME=13732	Command without arguments	The command returns the time of operation since the last reboot, in seconds.	0.12.8 or higher
60	BBOX	BBOX=X,Y,A,B,C,Z Example: BBOX=12838,11264,0,8	X – number of spots went through the black box. It is cleared at every 255*Y spots. Y – number of spots that can be stored in the	The command returns the black box status (BB).	0.13.8 or higher
		646,11264,0	black box. A – number of spots in the black box queuing for the transmission to the primary server. B – number of spots in the black box queuing for the transmission to the alternate server. C – number of spots in the black box queuing for the transmission to the auxiliary server. Z – number of the detected black box power on errors.		

61	HISTORY ID	HISTORY=ID[,D1,Dn] Example: HISTORY=12000,0,0,0,0,1,02.02.19,12:26:09,,,,,,0.00,0+0,0x00200224,0(112),0 (0),,,79	ID – number of the spot to read from the black box D1 – the first argument Dn – the last argument	The command for history reading from the black box. Command without arguments returns the current settings.	0.13.8 or higher
62	BLEMODE X	BLEMODE=X Example: BLEMODE=1	X –BLE operating mode (Bluetooth): X = 0 – disabled X = 1 – configuration	The command turns the Bluetooth operating mode on. Command without arguments returns the current settings.	0.14.1 or higher
63	ENABLELEDS X Example: ENABLELEDS 1	ENABLELEDS=1	X = 0 – LED indication always disabled X = 1 – normal mode of LED indication By default: X = 1	Configuring LED indication.	0.17.0 or higher
64	POWERSAVE X,Y Example: POWERSAVE 480, 600	POWERSAVE=480,600	X – timeout in seconds within the range of 1 to 592200 for switching to STANDBY mode If X = 0 – switching to STANDBY mode does not occur. Y – timeout in seconds within the range of 1 to 86400 for switching to IDLE mode If Y = 0 – switching to IDLE mode does not occur. By default: X = 0 and Y = 0.	Setting timeouts for switching to idle and standby modes at static navigation.	0.15.0 or higher

65	VOLTSAVE X,Y,Z Example: VOLTSAVE 0,10000, 5000	VOLTSAVE=0,10000, 5000	X – the number of the analog input for the power saving by voltage mode. For UMKa310: 0 – always the only analog input. Y – voltage in millivolts within the range of 0 to 40000 for switching to STANDBY mode (STANDBY). Switching from the mode occurs, if the voltage the input is lower (Y - 50), back to the mode, if voltage is higher (Y + 50). Z – voltage in millivolts within the range of 0 to 40000 for switching to IDLE mode (IDLE). Switching from the mode occurs, if the voltage the input is lower (Z - 50), back to the mode, if voltage is higher (Z + 50). By default for UMKa310: X = 0, Y = 0 and Z = 0. By default for UMKa312: X = -1, Y = 0 и Z = 0.	Setting the number of the analog input and voltage for switching to STANDBY and IDLE modes.	0.15.0 or higher
66	ACTIVEWIN X,Y	ACTIVEWIN=1200,150	X – activity window starting time. Time offset from the UTC day start, in seconds. Y – activity window duration, in seconds. 0 – if disabled. Minimum duration is 300 seconds. By default: X = 43200 and Y = 300. The activity window starts for 5 minutes at 3.00 pm, Moscow time.	Setting the activity window parameters.	0.17.0 or higher
67	GSMMODULE	GSMMODULE="1418B02 SIM868E32_BLE_EAT_20 190404_1436"	Command without arguments	Require modem firmware version	0.18.3 or
					higher

68	SATS	SATS A,24,263,72,29,A,17,50,37,23,A,2,159,23,28,V,6,0,0,29,V,12,0,0,26,N,74,0,0,0	The main letter for each satellite can obtain one of the following values: A - Active. This satellite is used for solving navigation tasks. V - visible. Satellite is tracked by receiver, but does not solve navigation task. N - Not tracked. Receiver does not track satellite, but knows it must present. Satellite number follows the main letter. Azimuth for satellite in degrees from 0 to 359 follows the satellite number. Satellite elevation quadrant in degrees from 0 to 90 follows the azimuth.	Returns the list of visible satellites	0.18.3 or higher
69	EGTSPROTOCOL X	EGTSPROTOCOL=0	X - Object Identifier (OID)	If X=0, OID forms out of 9-14 IMEI numbers	0.14.5 or higher
70	BBOX UPLOAD=S Example BBOX UPLOAD=0	BBOX=X,Y,A,B,C,Z Example: BBOX=12838,11264,12838,8646,11264,0	S - server for black box retransmission S=0 - black box retransmission onto primary server S=1 - black box retransmission onto alternate server S=2 - black box retransmission onto auxiliary server X - number of spots that did not pass the black box. Resets to zero every 255* spots. Y - number of spots that black box can keep A - number of spots in the black box in the queue to transmission onto primary server B - number of spots in the black box in the	Black box retransmission onto selected telematic server. In reply the black box status is as in command “BBOX”. »	0.18.12 or higher

			queue to transmission onto alternate server C - number of spots in the black box in the queue to transmission onto auxiliary server Z - number of detected black box failures from connected power supply		
71	BBOX UPLOAD	BBOX=12838,11264, 12838,8646,11264,0	Equivalent to ”BBOX UPLOAD=0”	Black box retransmission onto selected telematic server.	0.18.12 or higher
72	SETLBS X Example SETLBS 0	SETLBS=0	X - transmit LBS data onto the server: X=0 - parameter is not transmitted; X=1 - parameter is transmitted	Setup of LBS parameter transmission	0.19.8 or higher
73	SETVIB X Example SETVIB 1	SETVIB=1	X - transmit vibration level data onto the server: X=0 - parameter is not transmitted; X=1 - parameter is transmitted	Setup of vibration level transmission	0.19.8 or higher
74	VIB	VIB=3	Command without arguments	Current (instant) vibration level	0.19.8 or higher

75	IMSI	IMSI=250018611111941 1	Command without arguments	Command returns SIM-card IMSI	0.20.1 and higher
76	HOSTING	Connect...	Command without arguments	Command activates Hosting status test	0.20.0 and higher
77	SMOOTH X Example SMOOTH 51	SMOOTH=51	X - key filtration coefficient from the range 1-100. By enabled X=0 filte. By default X=0.	Track smoothing by Kalman filter	0.19.6 and higher
78	NETMON Example NETMON	NETMON=1,Mcc=250,Mnc=2,Lac=2302,Cid=30926	NETMON=1 - valid data. Mcc - mobile country code; Mnc - mobile network code; Lac - local area code; Cid - cell identificator.	Returns Net-monitoring data	0.19.6 and higher
79	ADMPROTOCOL X,Y Example ADMPROTOCOL 50,2	ADMPROTOCOL=50,2	X - mask od transmitted parameters according to protocol specification Y - unique tracker ID By default X=60, Y=1		0.20.4 and higher
80	SETEXT X Example SETEXT 1	SETEXT=1	X – transmission of power supply voltage onto the server; X=0 – transmission is disabled; X=1 –transmission is enabled. By default X=0	Transmission of power supply voltage onto the server	0.20.4 and higher
81	ERASE LOWLEVEL		Command without arguments	low-level formatting of FLASH-memory. Deletes everything.	0.20.4 and higher
82	REMCFGCONFIG E,D:P		E - permanent connection to remote configuration service	Command of remote configuration service control. Command duplicates “REMCFG STATUS”,	0.22.0 and

			E=0 - disabled E=1 - enabled D - domain of emote configuration service; P - port of remote configuration service	“REMCFG SETSERV”, “REMCFG ENABLE”, “REMCFG DISABLE”	higher
83	LLSBLE Example LLSBLE	Reply «LLSBLE=X0,Y0,X1,Y1,X2,Y2,X3,Y3»,	X0-X3 - mode of BLE sensor poll from 0 to 3. Xn=0 - poll is disabled; Xn=1 - poll of ESCORT TD-BLE FLS; Xn=2 - ESCORT temperature sensor; Xn=3 - ESCORT temperature and illumination sensor; Xn=4 - NEOMATICA temperature sensor ADM31; Xn=5 - NEOMATICA tilt sensor ADM32; Xn=6 - ESCORT tilt sensor; Xn=7 - Fuel flowmeter DFM.Parameters; Xn=8 -Fuel flowmeter DFM. Total consumption; Xn=9 - Fuel flowmeter DFM. Operation time; Xn=10 - Fuel flowmeter DFM. Consumption by cameras Xn=11 - GL-TV BLE FLS. Xn=12 - Temperature sensor ELA Blue COIN T; Xn=13 - Multifunctional sensor «TESLiOT».	Query of current settings for all wireless BLE sensors in one time. Command without arguments.Reply”LLSBLE=X0,Y0,X1,Y1,X2,Y2,X3,Y3”,	0.22.0 (UMKa 3 10.B) and higher

№	Command	Reply	Parameters	Description	Version
			Xn=14 – Tilt sensor Eurosens Degree BT; Xn=15 – FLS Eurosens Dominator Bt. Y0-Y3 - FLS MAC-address from 0 to 3. MAC address consists of 6 pairs hexadecimal вшпшеы separated by “:”. Example MAC: ’’C7:3B:E0:66:C6:3C” By default X0-X7=0, Y0 Y7=00:00:00:00:00:00		
84	LLSBLEn X,Y Example LLSBLEn 1,C7:3B:E0:66:C6:3C	LLSBLEn= 1, C7:3B:E0:66:C6:3C	n - sensor number from 0 to 3. Xn=0 - Disabled; Xn=1 - ESCORT TD-BLE FLS; Xn=2 - ESCORT temperature sensor; Xn=3 - ESCORT temperature and illumination sensor; Xn=4 - NEOMATICA temperature sensor ADM31; Xn=5 - NEOMATICA tilt sensor ADM32; Xn=6 - ESCORT tilt sensor; Fuel flowmeter DFM.Parameters; Xn=8 -Fuel flowmeter DFM. Total consumption; Xn=9 - Fuel flowmeter DFM. Operation time; Xn=10 - Fuel flowmeter DFM. Consumption by cameras Xn=11 - GL-TV BLE FLS.	Record of wireless sensors settings	1.1.5 and higher (UMKa 3 10.B)

			Xn=12 - Temperature sensor ELA Blue COIN T; Xn=13 - Multifunctional sensor «TESLiOT». Xn=14 – tilt sensor Eurosens Degree BT; Xn=15 – Eurosens Dominator Bt. FLS Y0-Y3 - FLS MAC-address from 0 to 3. MAC address consists of 6 pairs hexadecimal digits separated by ":". Example MAC:''C7:3B:E0:66:C6:3C" By default X0-X7=0, Y0 Y7=00:00:00:00:00:00		
85	BLESCAN X Example BLESCAN START	BLESCAN=1,0	X=START - launch scan; ; X=STOP - stop scan; X=STATUS - scan status and number of detected devices;	Scanner of BLE devices.	0.22.1 (UMKa 3 10.B)
86	FUEL Example FUEL	FUEL F7=1,T7=23,B7=3.5, S7=-71	Command without arguments Reply: Fx - fuel level, Tx - temperature, Bx - battery supply voltage, Sx- signal level where x - number of connected FLSs F0-F2 – fuel level RS485; F7-F10 – BLE fuel level; F15 – fuel level on input IN0 (AIN0); T0-T2– fuel temperature RS485; T7-T10 – BLE fuel temperature; B7-S10 – BLE battery voltage; S7-S10 – BLE signal level	Information on fuel level, temperature and auxiliary parameters from wired and wireless FLSs.	0.22.0 and higher

№	Command	Reply	Parameters	Description	Version
87	LlsReport Example LlsReport	LLSREPORT Addr0=0,Type0=NONE,Addr1=1,Type1=TD100,Sn1=86137,Fw1=1.9.1,Mode1=I,Level1=7,Addr2=2,Type2= NONE	Command withour arguments AddrX - address on bus. TypeX - FLS type: TypeX=NONE - FLS is being polled but not connected; TypeX=UNKNOWN - FLS is being polled and connected, type is not specified; TypeX=ESCORT - ESCORT FLS with Cyrillic characters on top; TypeX=TD500 - “ESCORT TD-500” FLS; TypeX=TD100 - “ESCORT TD-100” FLS; TypeX=TD150 - “ESCORT TD-150” FLS. SnX - serial number. FwX - firmware version. ModeX - smoothing mode: ModeX=I - “Intellectual”; ModeX=M - “Median”. LevelX - smoothing level from 0 to 15.	Return summative report on connected FLSs.	0.23.0 and higher

88	LLSFILTERn X,Y,Z	LLSFILTER0=0,1,0	n – FLS number. n=0…3 – for wired FLSs; n=7…10 – for wireless FLSs (except UMKa310); n=15 – for analog; X – filtration mode: X=0 – without filtration; X=1 – simple filter of low frequency (LFF); X=2 - compound filter (Median+LFF). Y – filtration level within the range from 1 to 20. Z – step of fuel level change for event generation. If Z=0, event generation is disabled. By default X=0, Y=1, Z=0	Record of settings for fuel level filtration.	0.28.0
89	LLSFILTERS	LLSFILTERS 0,X0,Y0,Z0,n,Xn,Yn,Zn.	Values of parameters and numbers of filters comply with “LLSFILTERn” commands	Reading of settings for all filters	0.28.0

90	LLSDETECTORn X,Y	LLSDETECTOR1=10,30	Record of settings of fill-ups drain detector n – number of FLS. n=0…3 – for wired FLSs; n=7…10 – for wireless (except UMKa310); n=15 – for analog; X – Time of detector operation for fill-up within the range from 0 to 120. 0 – fill-up detector is disabled. Y – Detector operation for drain within the range from 0 to 120.B 0 – detector for drain is disabled. By default X=10, Y=30	Record of settings of fill-ups drain detector	0.28.0
91	LLSDETECTORS	LLSDETECTORS 0,X0,Y0,Z0..n,Xn,Yn,Zn	Values of parameters and numbers of detectors complywith “LLSDETECTORn” command.	Reading of settings for all detectors.	0.28.0
92	IOFUELLIMn MIN,MAX		n – input number n=0 – IN0 (AIN0) MIN – minimum FLS operation value MAX – maximum FLS operation value	Setup of validity range of input signal for FLS connected to analog input that is set in”Analog FLS” mode.	0.28.0

№	Command	Reply	Parameters	Description	Version
93	TEMP			Query of current temperature inside the tracker.	1.0.5 (УМКа3 12)
94	SETTEMP X	SETTEMP=0	Command without arguments returns the following settings. X – Transmission of tracker temperature. X=0 – disabled; X=1 – enabled. By default: X = 0.	Setup of data transmission about temperature onto the server.	1.0.5 (UMKa 312)
95	NETWORK			Returns network name where the SIM card is logged in.	1.0.5
96	GSMSTATUS	GSMSTATUS=1,State=0x 01000000,CMEErr=-1,CMSErr=-1	State – modem state; CMEErr – the last modem failure.-1 - there is no last failure; CMSErr - last network failure. -1 - there is no last failure;	Query on state and last modem failures.	1.0.5
97	SETGSMSTATUS X	SETGSMSTATUS=0	X – record of states and failures into black box: X=0 – record is disabled; X=1 – record is enabled;	Setup of states and modem failures records into black box.	1.0.5
98	CHARGE [X[,Y]]	CHARGE=0,250	X – mode of quick charge from battery; X=0 – quick charge is off; X=1 – бquick charge is on. Y – battery capacity from 250 to 1100 mAh. By default X = 0, Y = 250	Command controls the function of quick charge from battery.	1.0.5 (UMKa 3 12)

99	DISCHARGE [X[,Y]]	DISCHARGE=0,250	X – time in seconds from 1 to 86400 before complete cut off when working from the battery. If X = 0 – maximum operation time is not limited. Y – time in seconds from 1 to 86400 before switching to IDLE mode when working from battery. If Y = 0 – switching to IDLE mode does not occur. By default X = 0 и Y = 0.	Sets maximum operation time of the tracker from battery and time of switching to power saving mode.	1.0.5 (UMKa 3 12)
100	SETAKB [X]	SETAKB=1	X – transmission of battery voltage on the server. X=0 – transmission is disabled; X=1 - transmission is enabled. By default X = 1	Setup of battery voltage transmission on the server.	1.0.5 (UMKa 3 12)
101	POWER	POWER=A,B,C,Z	A - power supply voltage, V; B - battery voltage, V; A -tracker temperature; Z - power supply operation mode. Of of the following statuses: INIT - initialization; MAIN - power supply from main source; AKB - power supply from battery; REPAIR - repair of completely discharged battery; SLOW - slow battery charge; FAST - quick battery charge; FUSE - battery failure; OFF - cut-off.	Command returns the status of power supply system.	1.0.5 (UMKa 3 12)

102	SETAMX [X[,Y]]	SETAMX=1,0x00000000	X – transmission of script parameters mode : X=0 – transmission is off; X=1 – transmission is on. Y – mask of transmitted parameters of type 0xFFFFFFFF, where 1 in bit value – parameter is transmitted, 0 – parameter is not transmitted. It makes sense only if X=1. Without arguments it returns current settings.	Setup of script parameters transmission.	1.0.5
			By default: X=1, Y=0x0		
103	AMX	AMX P0=27.0,P1=3.4,P2=-67	Pn – value of parameter n	Query of current values of all script parameters. Command without arguments.	1.0.5
104	BLESENS	BLESENS=T0=27.0,P0=3.4,P1=-67,P2=35,F1=1,T1=23.0,P8=3.5,P9=-61	Command without arguments Fn – fuel level of sensor n; Tn – temperature of sensor n; Pn – arbitrary parameter. Number of sensor n / 8, number of sensor parameter n / 8.	Query of all current values for BLE sensors.	1.0.1 (UMKa 3 10.B, UMKa 3 12)
105	BLEIDBEACON [EN[,UUID[,MAJOR[,MINOR[,ONEPWR]]]]]	BLEIDBEACON=0,D595A152-A7E9-4A1F-A65D-CCA4C719D2DF,0,0,-80	EN – mode of beacon operation: EN=0 – beacon is off; EN=1 – beacon is on; UUID – UUID of D595A152-A7E9-4A1F-A65D-CCA4C719D2DF type; MAJOR – Majorwithin the range from 0 to 65535; MINOR – Minor within the range from 0 to 65535; ONEPWR – estimated beacon value at the	Beacon setup.	0.27.0 (UMKa 3 10.B, UMKa3 12)

			distance of 1 meter.		
106	BLEIDLISTENn [MODE[,MAXDIST[,DEFEN[,EVENTEN[,UUID[,MAJOR[,MINOR]]]]]]]	BLEIDLISTEN1=0,10,0,0,D595A152-A7E9-4A1F-A65D-CCA4C719D2DF,0,0	n – listen channel from 0 to 3; MODE – mode of listen channel operation; MODE=0 – listen channel is off MODE=1 – reception of identifiers with exact coincidence of UUID, Major и Minor; MODE=2 – reception of identifiers with exact coincidence of UUID and Major. Minor can be any; MODE=3 – reception of identifiers with exact coincidence of UUID. Major and Minor can be any; MODE=4 – reception of identifiers with any UUID, Major and Minor; MAXDIST – maximum distance of identifiers reception. The correctly set identifier that is beyond the circle with MAXDIST radius will definitely not be “heard”. Everything that is near - it depends. Maximum value is limited by 100 meter. If 0, the distance is not controlled. DEFEN – transmit the value or not by default if there are no suitable identifiers. DEFEN=0 – there are no suitable identifiers, nothing is transmitted on the server; DEFEN=1 - when there are no suitable identifiers, 0 is transmitted on the server; EVENTEN – record of spots into black box by	Настройка канала прослушивания.	0.27.0 (UMKa 3 10.B, UMKa3 12)

			each change of channel value; EVENTEN=0 – record of spot into black box by change is not implemented; EVENTEN=1 – record of spot into black box by any change of channel state; UUID – UUID of D595A152-A7E9-4A1F-A65D-CCA4C719D2DF type; MAJOR – Major within the range from 0 to 65535; MINOR – Minor within the range from 0 to 65535;		
107	BLEID	BLEID=ID0=12345,DST0=15,…,ID3=543210,DST3=51	Command without arguments. IDn - identificator of visible identifier in channel n; DSTn – estimated distance to identifier in channel n. Estimation is implemented by the level of identifier signal.	Query of visible identifiers on all identification channels.	0.27.0 (UMKa 3 10.B, UMKa3 12)

APPENDIX B. Troubleshooting UMKa310/311

Trouble	Indication	Causes	Troubleshooting tips
The tracker does not turn on	LED is off	Power supply is not properly connected	Check that the power supply is properly connected (see section "Connecting power supply") and whether the polarity of the supply voltages is observed. The tracker has protection against reverse polarity and can continue operation after the error is fixed.
		Poor contact	Check the tracker supply connections to the on-board vehicle network. Check the connections made with “twisted pair” cable.
		Undervoltage	Using the multimeter, check the supply voltages directly on the pins of the tracker mount port. If the tracker is connected in close proximity to powerful consumers (heaters, starter, etc.), then during their operation the tracker supply voltage may drop below the minimum value. In this case, connect the tracker as close as possible to the vehicle battery.
The tracker does not connect to the server	The LED is on at the power-on, but then it goes off	The tracker is in the power saving mode. Modem error. LED indication is disabled.	Check the settings of the power saving modes. Check the power supply of the tracker. Enable the tracker LED indication.
	LED flashes 1 time	The SIM card is not installed or out of order. Insufficient supply voltage.	Install the SIM card (see Section "SIM card installation"). Disable the PIN, if enabled, or write the correct PIN-code into the tracker via the configurator (see section "Operating the configurator"). Check the SIM card priority settings. Check the power supply of the tracker.
	LED flashes 2 times	The terminal cannot register on the GSM network.	Check the coverage and the GSM signal strength of the selected mobile operator. Change the SIM card. Install the SIM card of another mobile operator. Make sure that the SIM card is not roaming. Install the card in another slot.
	LED flashes 3 times	The terminal is in the OFFLINE mode.	Check the settings of the power saving modes. Check the power supply of the tracker.
	LED flashes 4 times	The terminal cannot connect	Check SIM cards settings (APN, login, password, see section “Operating

		to the GPRS network.	the configurator”). Check the balance on the SIM card. Make sure that the packet data service is enabled. Reconnect the packet data service. Try to activate the SIM card in another device and install it into the tracker again.
	LED goes out 1 time	The terminal cannot connect to the primary server. The terminal cannot login on the primary server.	Check the tracker settings (server IP address, TCP port, see "Operating the configurator" section). Check the balance on the SIM card. Make sure the server is up and running. Check the settings of the tracker to be connected on the server. Pay special attention to the correctness of the IMEI entered. Check the correspondence between the selected TCP port and the data transfer protocol.
	LED goes out 2 times	The terminal cannot connect to the alternate server. The terminal cannot login on the alternate server.	
	LED goes out 3 times	The terminal cannot connect to the primary and alternate servers. The terminal cannot login on the primary and alternate servers.	
	Yellow LED is permanently on	Invalid coordinates. Disconnected. Unstable connection.	Wait for the GNSS receiver to fix the coordinates. Wait for 5 to 10 minutes for the tracker to reconnect. Use the SIM card of another mobile operator.

APPENDIX C. Troubleshooting UMKa312

Trouble	Indication	Causes	Troubleshooting tips
The tracker does not turn on	Green LED is off	Power supply is not properly connected	Check that the power supply is properly connected (see section "Connecting power supply") and whether the polarity of the supply voltages is observed. The tracker has protection against reverse polarity and can continue operation after the error is fixed.
		Poor contact	Check the tracker supply connections to the on-board vehicle network. Check the connections made with “twisted pair” cable.
		Undervoltage	Using the multimeter, check the supply voltages directly on the pins of the tracker mount port. If the tracker is connected in close proximity to powerful consumers (heaters, starter, etc.), then during their operation the tracker supply voltage may drop below the minimum value. In this case, connect the tracker as close as possible to the vehicle battery.
The tracker does not connect to the server	The yellow LED is off	No power supply voltage. Tracker is in SLEEP mode. Modem error. Delayed modem activation. Indication is disabled.	Check the settings of the power saving modes. Check the power supply of the tracker. Wait for 5-7 minutes before the end ofreceiver’s “cold” start. Enable the tracker LED indication.
	Yellow LED flashes 1 time	The SIM card is not installed or out of order. Insufficient supply voltage.	Install the SIM card (see Section "SIM card installation"). Disable the PIN, if enabled, or write the correct PIN-code into the tracker via the configurator (see section "Operating the configurator"). Check the SIM card priority settings. Check the power supply of the tracker.
	LED flashes 2 times	The terminal cannot register on the GSM network.	Check the coverage and the GSM signal strength of the selected mobile operator. Change the SIM card. Install the SIM card of another mobile operator. Make sure that the SIM card is not roaming. Install the card in another slot.

LED flashes 3 times	The terminal is in the OFFLINE mode.	Check the settings of the power saving modes. Check the power supply of the tracker.
LED flashes 4 times	The terminal cannot connect to the GPRS network.	Check SIM cards settings (APN, login, password, see section “Operating the configurator”). Check the balance on the SIM card. Make sure that the packet data service is enabled. Reconnect the packet data service. Try to activate the SIM card in another device and install it into the tracker again.
LED goes out 1 time	The terminal cannot connect to the primary server. The terminal cannot login on the primary server.	Check the tracker settings (server IP address, TCP port, see "Operating the configurator" section). Check the balance on the SIM card. Make sure the server is up and running. Check the settings of the tracker to be connected on the server. Pay special attention to the correctness of the IMEI entered. Check the correspondence between the selected TCP port and the data transfer protocol.
LED goes out 2 times	The terminal cannot connect to the alternate server. The terminal cannot login on the alternate server.	
LED goes out 3 times	The terminal cannot connect to the primary and alternate servers. The terminal cannot login on the primary and alternate servers.	
Yellow LED is permanently on	Invalid coordinates. Disconnected. Unstable connection.	Wait for the GNSS receiver to fix the coordinates. Wait for 5 to 10 minutes for the tracker to reconnect. Use the SIM card of another mobile operator.
Red LED is off	Navigation receiver error. Indication is disabled.	Reboot the tracker. Enable tracker indication.
Red LED flashes 1 time	Coordinates are not detected. “Cold”, “warm” or “hot” start. No visible satellites.	Wait for 5-7 minutes before the end of receiver’s “cold” start. Follow recommendation in section “Setup of the tracker into the vehicle”. Install the tracker as further as possible from radiointerference sources (breakers, transmitters, etc.)

	Red LED flashes 2 times	Two-dimensional coordinates are detected, minimum number of visible satellites.	Wait for 5-7 minutes before the end of receiver's "cold" start. Follow recommendation in section "Setup of the tracker into the vehicle". Install the tracker as further as possible from radiointerference sources (breakers, transmitters, etc.) Check connection to the server. Make sure the server is up and running.
	Red LED flashes 3 times	Three-dimensional coordinates are detected, minimum number of visible satellites.	Check connection to the server. Make sure the server is up and running.

APPENDIX D. Default settings values

Parameter	Default value
Navigation	
Minimum velocity, km/h	3
Angle in degrees	10
Distance, m	300
Acceleration, km/h	10
Minimum distance between spots, m	2
Dynamic angle	0
The recording period at driving, sec	30
The recording period at stops, sec	300
Accelerometer positioning	Yes
Activation threshold	50
Static navigation mode timeout, sec	300
Input positioning	No
Maximum HDOP	5.0
Minimum number of satellites	5
Maximum HDOP with minimum satellites	2.4
Filtration coefficient	0
Inputs/Outputs	
IN0 input mode	Discrete (+)
IN1 input mode	Discrete (+)

Logical Low on IN0		5000
Logical High on IN0		6000
Tracker output is on		No
SIM-cards		
SIM0	Profiles	Auto
	APN	No
	Login	No
	Password	No
	Use PIN	No
	Allow roaming	Yes
Servers		
Primary server	Select from the list	GLONASSSoft
	Server address	gw1.glonasssoft.ru
	Port	15050
	Protocol	Wialon Combine
Uploading order		From old to new
Accelerometer		No
RSSI signal level		No
Virtual odometer		No
LBS data		No
Vibration levels		No
Group records by		5
Time interval between packet transmissions, sec		300
Maximum packet size		1460
Interfaces		
RS-485	Mode	FLS via LLS
	Speed	19200

FLSs		
Sensor 0		1
Sensor 1		Empty
Sensor 2		Empty
BLE FLSs		
FLSs 1-0		Empty
Phone numbers		
Authorized phone numbers		Empty
System		
Tracker name		UMKa310/UMKa311/UMKa312
Password		0
Remote configuration	Permanent connection	No
Bluetooth parameters	Mode	Configuration

APPENDIX E. Description of the Wialon system parameters

Protocol		Description	
IPS	Combine		
status	param1	Tracker status. Bit field. The assignment of bits is given below:	
		Bit	Bit discription
		0 - 1	Reserved
		2	Primary server is disconnected (0-connected)
		3 - 4	Reserved
		5	Coordinates invalidity attribute (0 – valid, 1 – not valid)
		6	Coordinated are fixed without moving (1-fixed)
		7	Sign of tracker low power voltage (0-norm, 1-low)
		8	Reserved
		9	1 – suppressed GNSS signals
		10	Reserved
		11	Sign of tracker high power voltage (0-norm, 1-high)
		12-16	Reserved
		17	Status of the discrete output 0 (0 – open, 1 – shorted)
		18	Reserved
		19	Alternate server is disconnected. (0 – Connected. When the alternate server is not set, 0 is always returned)
		20	The terminal is connected to the remote configuration server. (1 – connected)
		21	Connected via USB
		22	Connected to the update server

Protocol			
IPS	Combine	23	Reserved
		24	Roaming (0 – home network, 1 – guest network)
		25	The terminal is attached to a hosting. (0 – not attached, 1 – attached)
		26-27	Reserved
		28	Faulty “black box” (0 – OK, 1 –faulty)
		29	1 – power saving mode IDLE
		30	Auxiliary server is disconnected. (0 – Connected. When the auxiliary server is not set, 0 is always returned)
		31	1 – power saving mode STANDBY
hdop		Reduced accuracy in the horizontal plane	
sats_gps	param2	GPS satellites solutions	
sats_glonass	param3	GLONASS satellites solutions	
in1		Value of the discrete input IN0 (AIN0)	
in2		Value of the discrete input IN1 (DIN0)	
adc1		Voltage value for the analog input AIN0 (IN0), V	
out1		Value of the discrete output IN1 (DIN0). Where 1 – output shorted.	
fuel1		Fuel level from FLS0	
fuel2		Fuel level from FLS1	
fuel3		Fuel level from FLS2	
fuel8		Fuel level from BLE FLS0	
fuel9		Fuel level from BLE FLS1	
fuel10		Fuel level from BLE FLS2	
fuel11		Fuel level from BLE FLS3	
fuel15		Fuel level from BLE FLS7	
temp1		Fuel temperature from FLS0	
temp2		Fuel temperature from FLS1	
temp3		Fuel temperature from FLS2	
temp8		Fuel temperature from BLE FLS0	
temp9		Fuel temperature from BLE FLS1	
temp10		Fuel temperature from BLE FLS2	

Protocol	Description

temp11		Fuel temperature from BLE FLS3
acc_x	param16	Terminal acceleration along the X axis (width). 1000 units are equal to 1G. The transmission is configured with the “SETACC” command.
acc_y	param17	Terminal acceleration along the Y axis (depth). 1000 units are equal to 1G. The transmission is configured with the “SETACC” command.
acc_z	param18	Terminal acceleration along the Z axis (height). 1000 units are equal to 1G. The transmission is configured with the “SETACC” command.
rssi	param7	The strength of the GSM signal received by the GSM modem in dBm. It can range from -113 to -51 dBm.
odometer	param11	Mileage by the virtual odometer, in meters.
vib	param19	Vibration level
mcc	mcc	Mobile country code
mnc	mnc	Mobile network code
lac	lac	Local area code
cell_id	cell id	Cell identificator
pwr_ext	param8	External power supply, V. Virtual channel.
pwr_akb	param9	Battery voltage, V. **(For UMKa312 only)**
temp_int	param10	Internal tracker temperature. **(For UMKa312 only)**
fuel16		Fuel level from FLS on input IN0 (AIN0)
Amx0	param64	Script parameter 0 (Amx0 in “History” tab)
Amx1	param65	Script parameter 1 (Amx1 in “History” tab)
...		
Amx31	param95	Script parameter 31 (Amx31 in “History” tab)
Ble0	param128	BLE sensor 0. Auxiliary parameter 0.
Ble1	param129	BLE sensor 1. Auxiliary parameter 1.
...		
Ble7	param135	BLE sensor 0. Auxiliary parameter 7.
Ble8	param136	BLE sensor 1. Auxiliary parameter 0.
Ble9	param137	BLE sensor 1. Auxiliary parameter 1.
...		

Ble15	param143	BLE sensor 1. Auxiliary parameter 7.
...		
Ble56	param184	BLE sensor 7. Auxiliary parameter 0.
Ble57	param185	BLE sensor 7. Auxiliary parameter 1.
...		
Ble64	param191	BLE sensor 7. Auxiliary parameter 7.
BleId0	driver_code8	BLE identification. Channel 0.
BleId1	driver_code9	BLE identification. Channel 1.
BleId2	driver_code10	BLE identification. Channel 2.
BleId3	driver_code11	BLE identification. Channel 3.

APPENDIX F. Description of BLE sensors parameters

The set of transmitted parameters is available for each model of BLE sensors/FLSs.

Table 6.4 Parameters of Escort TD-BLE FLS

Sensor number	Parameter description	Combine Protocol	IPS Protocol
0	Fuel level	fuel8	fuel8
	Temperature	temp8	temp8
	Battery voltage	param128	Ble0
	dBm signal level	param129	Ble1
n	Fuel level	fuel(8+n)	fuel(8+n)
	Temperature	temp(8+n)	temp(8+n)
	Battery voltage	param(128+8n)	Ble(0+8n)
	Signal level dBm	param(129+8n)	Ble(1+8n)

Table 6.5 Parameters of Escort TL-BLE temperature sensor

Sensor number	Parameter description	Combine Protocol	IPS Protocol
0	Temperature -70.0…125.0 C°	temp8	temp8
	Battery voltage 2.0…4.0 V	param128	Ble0
	dBm voltage level	param129	Ble1
n	Temperature -70.0…125.0 C°	temp(8+n)	temp(8+n)
	Battery voltage 2.0…4.0 V	param(128+8n)	Ble(0+8n)
	Signal level dBm	param(129+8n)	Ble(1+8n)

Table 6.6 Parameters of Escort TL-BLE temperature and illumination sensor

Sensor number	Parameters description	Combine Protocol	IPS Protocol
0	Temperature -70.0…125.0 C°	temp8	temp8
	Battery voltage 2.0…4.0 V	param128	Ble0
	Signal level dBm	param129	Ble1
	Illumination 0...10000 Lux	param130	Ble2
n	Temperature -70.0…125.0 C°	temp(8+n)	temp(8+n)
	Battery voltage 2.0…4.0 B	param(128+8n)	Ble(0+8n)
	Signal level dBm	param(129+8n)	Ble(1+8n)
	Illumination 0...10000 Lux	param(130+8n)	Ble(2+8n)

Table 6.7 Parameters of Neomatica ADM31 temperature sensor

Sensor number	Parameters description	Combine Protocol	IPS Protocol
0	Temperature -30.0…125.0 C°	temp8	temp8
	Battery voltage 2.0…4.0 V	param128	Ble0
	Signal level dBm	param129	Ble1
	Illumination 0.01. 83000.00 Lux	param130	Ble2
	Humidity 0…100 %	param131	Ble3
	Status. Bit field. Bit 0 – Magnetic field; Bit 1 – Sign of sending extra package due to magnetic sensor; Bit 5 – Humidity sensor error; Bit 6 – Temperature sensor error; Bit 7 – Illumination sensor error.	param132	Ble4
n	Temperature -30.0…125.0 C°	temp(8+n)	temp(8+n)
	Battery voltage 2.0…4.0 V	param(128+8n)	Ble(0+8n)
	Signal level dBm	param(129+8n)	Ble(1+8n)

	Illumination 0.01. 83000.00 Lux	param(130+8n)	Ble(2+8n)
	Humidity 0…100 %	param(131+8n)	Ble(3+8n)
	Status. Bit field.	param(132+8n)	Ble(4+8n)

Table 6.8 Parameters of Neomatica ADM32 tilt sensor

Sensor number	Parameters description	Combine Protocol	IPS Protocol
0	Battery voltage 2.0…4.0 B	param128	Ble0
	Signal level dBm	param129	Ble1
	Angle 0…180°	param130	Ble2
	Fixed angle 0…180°	param131	Ble3
	Status. Bit field. Bit 0 – Flag of movement Bit 1 – Flag of active angle change Bit 2 – Flag of exceeding the angle value limits (overturn) Bit7 – Angle sensor error	param132	Ble4
n	Battery voltage.0…4.0 B	param(128+8n)	Ble(0+8n)
	Signal level dBm	param(129+8n)	Ble(1+8n)
	Angle 0…180°	param(130+8n)	Ble(2+8n)
	Fixed angle 0…180°	param(131+8n)	Ble(3+8n)
	Status. Bit field.	param(132+8n)	Ble(4+8n)

Table 6.9 Parameters of Escort DU-BLE tilt sensor

Sensor number	Parameters description	Combine Protocol	IPS Protocol
0	Temperature -70.0…125.0 C°	temp8	temp8
	Battery voltage 2.0…4.0 V	param128	Ble0
	Signal level dBm	param129	Ble1
	Tilt 0..180 °	param130	Ble2
	Upper angle calibration 0..180 °	param131	Ble3
	Lower angle calibration 0..180 °	param132	Ble4
	Operation time of sensor	param133	Ble5
	Sensor activation In angle control mode:0x01 - activation occurred-angle is exceeded	param134	Ble6
n	Tempreture -70.0…125.0 C°	temp(8+n)	temp(8+n)
	Battery voltage 2.0…4.0 V	param(128+8n)	Ble(0+8n)
	Signal level dBm	param(129+8n)	Ble(1+8n)
	Tilt 0..180 °	param(130+8n)	Ble(2+8n)
	Upper angle calibration 0..180 °	param(131+8n)	Ble(3+8n)
	Lower angle calibration 0..180 °	param(132+8n)	Ble(4+8n)
	Operation time of sensor	param(133+8n)	Ble(5+8n)
	Sensor activation	param(134+8n)	Ble(6+8n)

Table 6.10 Parameters of Escort TD-BLE FLS

Sensor number	Parameters description	Combine Protocol	IPS Protocol
0	Fuel level	fuel8	fuel8
	Temperature	temp8	temp8
	Battery voltage	param128	Ble0
	dBm signal level	param129	Ble1
N	Fuel level	fuel(8+n)	fuel(8+n)
	Temperature	temp(8+n)	temp(8+n)
	Battery voltage	param(128+8n)	Ble(0+8n)
	Signal level dBm	param(129+8n)	Ble(1+8n)

Table 6.11 Description of parameters for “DFM.Parameters” sensor

Sensor number	Parameters description	Combine Protocol	IPS Protocol
0	Fuel temperature -40…215 C°	temp8	temp8
	Battery charge level 0..100 %	param128	Ble0
	Signal level dBm	param129	Ble1
	Fuel consumption rate per hour 0.00..500.00 l/h	param130	Ble2
	Modes of engine and cameras operation. Bits 0 - 3 camera mode “Supply”, bits 4 - 7 camera mode “Reverse”, bits 4 - 7 engine operation mode is based on consumption rate	param131	Ble3
	Fuel consumption rate per hour in the camera “Supply” 0.00..500.00 l/h	param132	Ble4
	Fuel consumption rate per hour in the camera “Reverse” 0.00..500.00 l/h	param133	Ble5
	Operation time of flowmeter. Interference. sec	param134	Ble6
	Mask of flowmeter failures. Bit field. Bit 0 – Fuel temperature. Data is not available or incorrect; Bit 5 – Failure of AD converter launch; Bit 8 – Calibration is not available; Bit 10 – Low battery charge (<10 %); Bit 21– Real time clocks. Bit synchronizing is not available ; Bit 31 – Device is working in production mode;	param135	Ble7
n	Fuel temperature -40…215 C°	temp(8+n)	temp(8+n)
	Battery charge level 0..100 %	param(128+8n)	Ble(0+8n)
	Signal level dBm	param(129+8n)	Ble(1+8n)
	Fuel consumption rate per hour 0.00..500.00 l/h	param(130+8n)	Ble(2+8n)
	Modes of engine and cameras operation. Bits 0 - 3 camera mode “Supply”, bits 4 - 7 camera mode “Reverse”, bits 4 - 7 engine operation mode is based on consumption rate	param(131+8n)	Ble(3+8n)
	Fuel consumption rate per hour in the camera “Supply” 0.00..500.00 l/h	param(132+8n)	Ble(4+8n)
	Fuel consumption rate per hour in the camera “Reverse” 0.00..500.00 l/h	param(133+8n)	Ble(5+8n)
	Opration time of flowmeter. Interference. sec	param(134+8n)	Ble(6+8n)
	Mask of flowmeter failures.	param(135+8n)	Ble(7+8n)

Table 6.12 Description of parameters for “DFM.Total consumption” sensor

Sensor number	Parameters description	Combine Protocol	IPS Protocol
0	Signal level dBm	param128	Ble0
	Total fuel consumption of high resolution. Resolution 0.001 l	param129	Ble1
	Total fuel consumption of high resolution. Idle run. Resolution 0.001 l	param130	Ble2
	Total fuel consumption of high resolution. Optimum. Resolution 0.001 l	param131	Ble3
	Total fuel consumption of high resolution. Overload. Resolution 0.001 l	param132	Ble4
	Total fuel consumption of high resolution. Wrapping. Resolution 0.001 l	param133	Ble7
n	Signal level dBm	param(128+8n)	Ble(0+8n)
	Total fuel consumption of high resolution. Resolution 0.001 l	param(129+8n)	Ble(1+8n)
	Total fuel consumption of high resolution. Idle run. Resolution 0.001 l	param(130+8n)	Ble(2+8n)
	Total fuel consumption of high resolution. Optimum. Resolution 0.001 l	param(131+8n)	Ble(3+8n)
	Total fuel consumption of high resolution. Overload. Resolution 0.001 l	param(132+8n)	Ble(4+8n)
	Total fuel consumption of high resolution. Wrapping. Resolution 0.001 l	param(133+8n)	Ble(5+8n)

Table 6.13 Description of parameters for “DFM.Operation time” sensor

Sensor number	Parameters description	Combine Protocol	IPS Protocol
0	Signal level dBm	param128	Ble0
	Flowmeter operation time , sec	param129	Ble1
	Flowmeter operation time. Idle mode, sec	param130	Ble2
	Flowmeter operation time. Optimum mode, sec	param131	Ble3
	Flowmeter operation time. Overload, sec	param132	Ble4

	Flowmeter operation time.Wrapping, sec	param133	Ble7
n	Signal level dBm	param(128+8n)	Ble(0+8n)
	Flowmeter operation time , sec	param(129+8n)	Ble(1+8n)
	Flowmeter operation time. Idle mode, sec	param(130+8n)	Ble(2+8n)
	Flowmeter operation time. Optimum mode, sec	param(131+8n)	Ble(3+8n)
	Flowmeter operation time. Overload, sec	param(132+8n)	Ble(4+8n)
	Flowmeter operation time.Wrapping, sec	param(133+8n)	Ble(5+8n)

Table 6.14 Description of parameters for “DFM. Camera consumption” sensor

Sensor number	Parameters description	Combine Protocol	IPS Protocol
0	Signal level dBm	param128	Ble0
	Total fuel consumption of high resolution. Camera “Supply”. Resolution 0.001 l	param129	Ble1
	Total fuel consumption of high resolution. Camera “Reverse”. Resolution 0.001 l	param130	Ble2
	Total fuel consumption of high resolution. Negative. Resolution 0.001 l	param131	Ble3
	Total fuel consumption of high resolution.. Camera “Supply”. Wrapping. Resolution 0.001 l	param132	Ble4
	Total fuel consumption of high resolution.. Camera “Reverse”. Wrapping. Resolution 0.001 l	param133	Ble7
n	Signal level dBm	param(128+8n)	Ble(0+8n)
	Total fuel consumption of high resolution. Camera “Supply”. Resolution 0.001 l	param(129+8n)	Ble(1+8n)
	Total fuel consumption of high resolution. Camera “Reverse”. Resolution 0.001 l	param(130+8n)	Ble(2+8n)
	Total fuel consumption of high resolution. Negative. Resolution 0.001 l	param(131+8n)	Ble(3+8n)

	Total fuel consumption of high resolution.. Camera “Supply”. Wrapping. Resolution 0.001 l	param(132+8n)	Ble(4+8n)
	Total fuel consumption of high resolution.. Camera “Reverse”. Wrapping. Resolution 0.001 l	param(133+8n)	Ble(5+8n)

The peculiarity of “GL-TV BLE” FLS is that it transmits fuel level without preinstallation of empty and full tanks levels. That is a FLS of random length can have output data within the range between 0 and 65535. At the same time the fuel level in “fuel” type parameters is limited by the range from 0 to 32767. If a rough level within the range higher than 32767 is needed, use parameter “Relative fuel level”. In other cases use “fuel” type parameter as the setup of filtration level parameters is available for it.

Table 6.15 Description of parameters for “GL-TV BLE” FLS

Sensor number	Parameters description	Combine Protocol	IPS Protocol
0	Fuel level from 0 to 32767	fuel8	fuel8
	Temperature	temp8	temp8
	Relative fuel level from 0 to 65535	param128	Ble0
	Message reader	param129	Ble1
	Signal level dBm	param130	Ble2
n	Fuel level from 0 to 32767	fuel(8+n)	fuel(8+n)
	Temperature	temp(8+n)	temp(8+n)
	Relative fuel level from 0 to 65535	param(128+8n)	Ble(0+8n)
	Message reader	param(129+8n)	Ble(1+8n)
	Signal level dBm	param(130+8n)	Ble(2+8n)

Temperature sensor ELA “Blue COIN T”. Xn=12. Parameters are given in the table.

Table 6.16 Description of parameters for ELA “Blue COIN T” temperature sensor

Sensor number	Parameters description	Combine Protocol	IPS Protocol
0	Temperature -30.0…70.0 C°	temp8	temp8
	Signal level dBm	param128	Ble0
n	Temperature -30.0…70.0 C°	temp(8+n)	temp(8+n)
	Signal level dBm	param(128+8n)	Ble(0+8n)

Sensor “TESLiOT”. Xn=13. Parameters are given in the table.

Table 6.17 Description of parameters for ELA “Blue COIN T” temperature sensor

Sensor number	Parameters description	Combine Protocol	IPS Protocol
0	Temperature, C°	temp8	temp8
	Power supply voltage, V	param128	Ble0
	Triggers activation: Closed doors on magnetometer - 0x01 Open doors on magnetometer – 0x02 Alarm 1 – 0x04 Alarm 2 – 0x08	param129	Ble1
	Acceleration on X axis, g	param130	Ble2
	Acceleration on Y axis, g	param131	Ble3
	Acceleration on Z axis, g	param132	Ble4
	Level of magnetic field, relative units	param133	Ble5
	Level of illumination, Lux	param134	Ble6
	Level of humidity, %	param135	Ble7
n	Temperature, C°	temp(8+n)	temp(8+n)
	Power supply voltage, V	param(128+8n)	Ble(0+8n)

	Triggers activation: Closed doors on magnetometer - 0x01 Open doors on magnetometer – 0x02 Alarm 1 – 0x04 Alarm 2 – 0x08	param(129+8n)	Ble(1+8n)
	Acceleration on X axis, g	param(130+8n)	Ble(2+8n)
	Acceleration on Y axis, g	param(131+8n)	Ble(3+8n)
	Acceleration on Z axis, g	param(132+8n)	Ble(4+8n)
	Level of magnetic field, relative units	param(133+8n)	Ble(5+8n)
	Level of illumination, Lux	param(134+8n)	Ble(6+8n)
	Level of humidity, %	param(135+8n)	Ble(7+8n)

For tilt angle sensor Eurosens Degree BT Xn=14 parameters are given in the table.

Table 6.18 Description of parameters for “Eurosens Degree BT” tilt angle sensor

Sensor number	Parameters description	Combine Protocol	IPS Protocol
0	Temperature, C°	temp8	temp8
	Signal level dBm	param128	Ble0
	Angle X, -90°...+90°	param129	Ble1
	Angle Y, -90°...+90°	param130	Ble2
	Angle Z, -90°...+90°	param131	Ble3
	Sensor status	param132	Ble4
	Number of events	param133	Ble5
	Number of event chains	param134	Ble6
n	Temperature, C°	temp(8+n)	temp(8+n)
	Signal level dBm	param(128+8n)	Ble(0+8n)
	Angle X, -90°...+90°	param(129+8n)	Ble(1+8n)
	Angle Y, -90°...+90°	param(130+8n)	Ble(2+8n)

	Angle Z, -90°...+90°	param(131+8n)	Ble(3+8n)
	Sensor status	param(132+8n)	Ble(4+8n)
	Number of events	param(133+8n)	Ble(5+8n)
	Number of event chains	param(134+8n)	Ble(6+8n)

For FLS Eurosens Dominator Bt Xn=15 parameters are given in the table.

Table 6.19 Description of parameters for “Eurosens Dominator BT” FLS

Sensor number	Parameters description	Combine Protocol	IPS Protocol
0	Detector value	fuel8	fuel8
	Temperature, C°	temp8	temp8
	Battery charge , %	param128	Ble0
	Signal level dBm	param129	Ble1
	Message number	param130	Ble2
	Fuel amount, l.	param131	Ble3
	Fuel amount, % of fuel from full tank	param132	Ble4
n	Detector value	fuel(8+n)	fuel(8+n)
	Temperature, C°	temp(8+n)	temp(8+n)
	Battery charge , %	param(128+8n)	Ble(0+8n)
	Signal level dBm	param(129+8n)	Ble(1+8n)
	Message number	param(130+8n)	Ble(2+8n)
	Fuel amount, l.	param(131+8n)	Ble(3+8n)
	Fuel amount, % of fuel from full tank	param(132+8n)	Ble(4+8n)

APEENDIX G. Modem status

For command “GSMSTATUS” the response “GSMSTATUS=1, State=0x01000000, CMEErr=-1, CMSErr=-1” will be received, where State - Is the mask of modem status:

0x00000001 - Power supply to the modem 0x00000002 - Initialization of basic functions 0x00000004 - Initialization of card 0x00000008 - Registration in network 0x00000010 - Context 0x00000020 - Initialization online 0x00000100 - Power supply is given onto modem 0x00000200 - Basic functions work 0x00000400 - SIM card is in slot 0x00000800 - There is registration in network 0x00001000 - Context 0x00002000 - It is online	0x00010000 - Primary server 0x00020000 - Second server 0x00040000 - Third server 0x00080000 - Update server 0x00100000 - Configuration server 0x00200000 - Hosting server 0x01000000 - SIM0 0x02000000 - SIM1 0x04000000 - Roaming 0x80000000 - Modem failure CMEErr – the last modem failure CMSErr – the last network failure

APPENDIX H. Access spots

If access spot of network operation is not specified in settings(empty), the tracker will automatically use another spot, login and password when connecting to GPRS in familiar network.

Network code	Access spot (APN)	Login	Pass	Operator
Estonia				
24801	internet.emt.ee			m2mexpress
Russia				
25001	internet.mts.ru	mts	mts	MTS
25002	internet			MegaFon
25006	internet.danycom.ru			DANYCOM
25008	internet			Vainah Telecom
25011	internet.yota			Yota
25020	internet.tele2.ru			Tele2
25027	internet.letai.ru			Letai
25032	internet			Win mobile
25033	internet.sts.ru			Sevmobile
25034	internet.ktkru.ru			Krymtelekom
25035	inet.ycc.ru	motiv	motiv	MOTIV
25042	internet.emt.ee			ГудЛайн
25060	internet	internet	internet	Volna mobile
25062	m.tinkoff			Tinkoff Mobile
25077	era	era	era	АО «ГЛОНАСС»
25099	internet.beeline.ru	beeline	beeline	Beeline
Republic of Belarus				
25701	web.velcom.by	web	web	velcom
25702	mts	mts	mts	MTS
25704	internet.life.com.by			life☺
Armenia				

28301	internet.beeline.am	internet	internet	Beeline
Network code	Access spot (APN)	Login	Pass	Operator
28304	connect.kt.am			Karabakh Telecom
28305	inet.vivacell.am			VivaCell-MTS
28310	internet			Ucom
Azerbaijan				
40001	internet			Azercell
40002	internet.bakcell.com			Bakcell
40004	nar			Nar Mobile
40006	internet			Naxtel
Kazakhstan				
40101	internet.beeline.kz	@internet.beeline	beeline	Beeline
40102	internet			Kcell
40107	internet.altel.kz			Altel
40177	internet.tele2.kz			Tele2.kz
Kirghizia				
43701	internet.beeline.kg			Beeline
43705	internet			MegaCom
43709	internet			O!
Nigeria				
62120	internet.ng.airtel.com			Airtel
62130	web.gprs.mtnnigeria.net			MTN
62150	gloflat	flat	flat	Glo
62160	9mobile			9mobile

Appendix I. List of readable and transmitted parameters from CAN bus

The readable parameters are givem in the table of requested parameters. At the same time the checkup of vehicle's ability to support this parameter is implemented, and the request for unsupported parameters is not implemented.

Table 6.20 List of readable and transmitted parameters:

PID	Name	Combine Protocol	IPS Protocol
0x0C	Engine rotation rate, rot/min	Param64	Amx0
0x0D	Speed, km/h	Param65	Amx1
0x05	Engine temperature, 0C	Param66	Amx2
0x1F	Time of work after engine start, sec	Param67	Amx3
0x5E	Instant fuel consumption l/h	Param68	Amx4
0x04	Calculated value of load on engine, %	Param69	Amx5
0x43	Absolute value of load on engine, %	Param70	Amx6
0x11	Position of throttle valve, %	Param71	Amx7
0x51	Fuel type	Param72	Amx8
0x2F	Fuel level, %	Param73	Amx9
0xA6	Mileage	Param74	Amx10
0x21	Distance crossed with turned on lamp "check engine"	Param75	Amx11
0x46	Ambient temperature, 0C	Param76	Amx12
0x0F	Temperature of inlet air, 0C	Param77	Amx13
-	Filtered fuel level	Param78	Amx14

Description	Combine Protocol	IPS Protocol
List of supported PID’ов (0x01-0x20)	Param88	Amx24
List of supported PID’ов (0x20-0x40)	Param89	Amx25
List of supported PID’ов (0x41-0x60)	Param90	Amx26
List of supported PID’ов (0x61-0x80)	Param91	Amx27
List of supported PID’ов (0xA1-0xC0)	Param93	Amx29
List of supported PID’ов (0xC1-0xE0)	Param94	Amx30

HISTORY CHANGE

Version	Description	Date
1.0	First document version	29.01.2019
1.1	Section 2.16 “Configuration via Bluetooth” is added Information about configurator 1.5.0 version is added	11.02.2019
1.2	Images are updated Section 2.13 ”Power supply manager” is added section 3.4 “Mobile configurator” is added Section 5.5 “Manufacrurer warranty” is updated List of commands is updated	24.06.2019
1.3	UMKa310.H version is added	10.02.2020
1.4	Added: Appendix E “Access spots” Chapter “Frequently asked questions” is added Section 3.7 “Navigation” tab is updated Section 2.17 “LBS positioning” is added Section 2.12 “BLE FLS conection” is added Section .13 “BLE scanner” is added Section 3.14 “BLE FLSs” is added New commands are added	18.02.2020

2.0	Information about UMKa312 is added into sections Section 2.7 “Battery installation” is added Section3.15 “FLS fiters” is added Section 3.16 “UMKa312 power supply manager” is added APPENDIX E “Description of BLE sensors parameters” is added APPENDIX F “Modem status” is added New commands are added	11.09.2020
2.1	Failures correction	18.09.2020
3.0	Information about UMKa311 is added into sections Section 3.17 “BLE identification” is added	30.10.2020
3.1	Section 2.23 “CAN connection” is added APPENDIX I “List of readble and transmitted parameters” is added New commands are added	21.04.2021